

Supplementary Material online

**Synthesis and biological properties of novel 3-(pyrazol-1-yl)-6-oxopyridazine
derivatives**

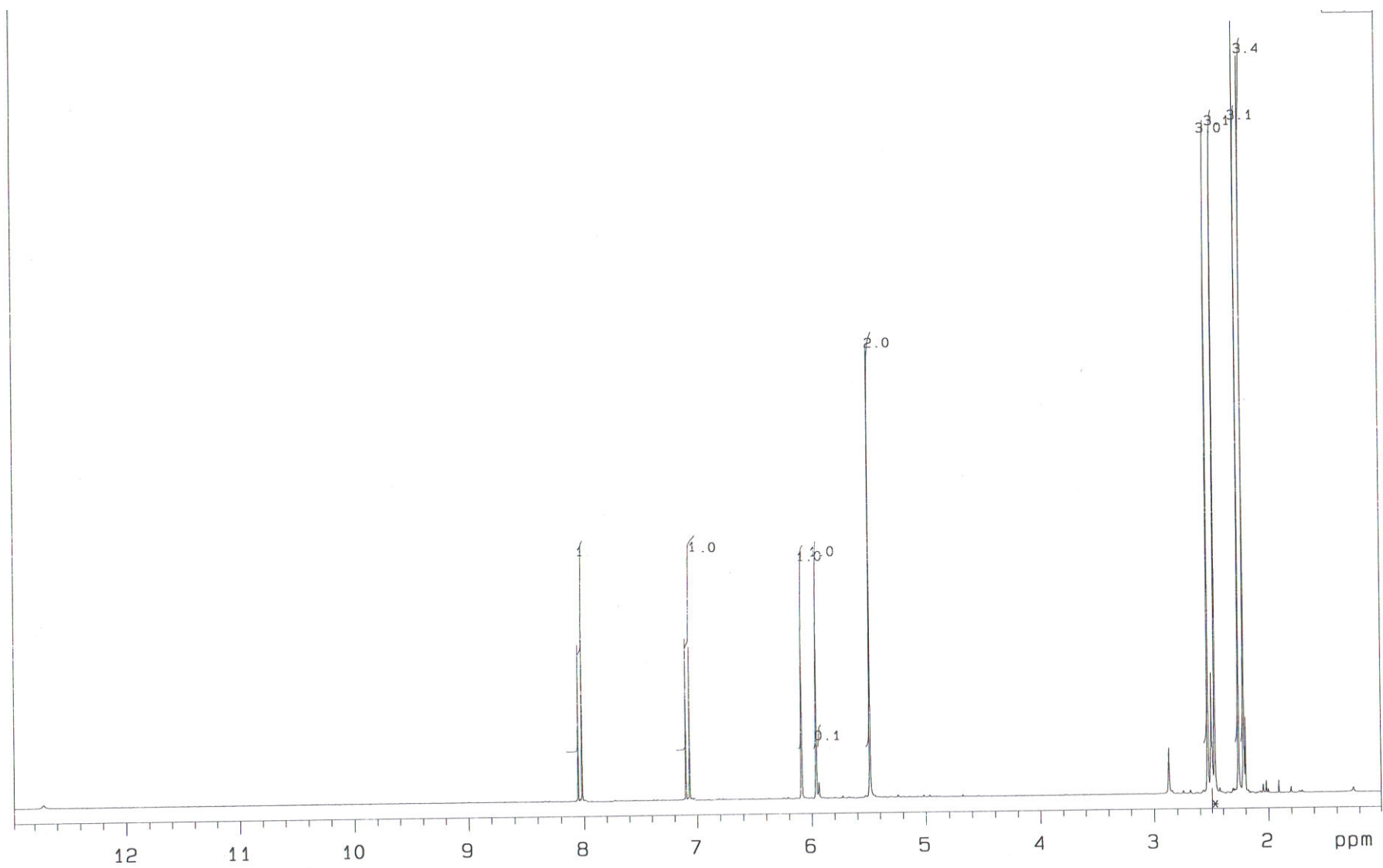
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^aNational Agrarian University of Armenia, 74, Teryan str., Yerevan, 0009, Armenia

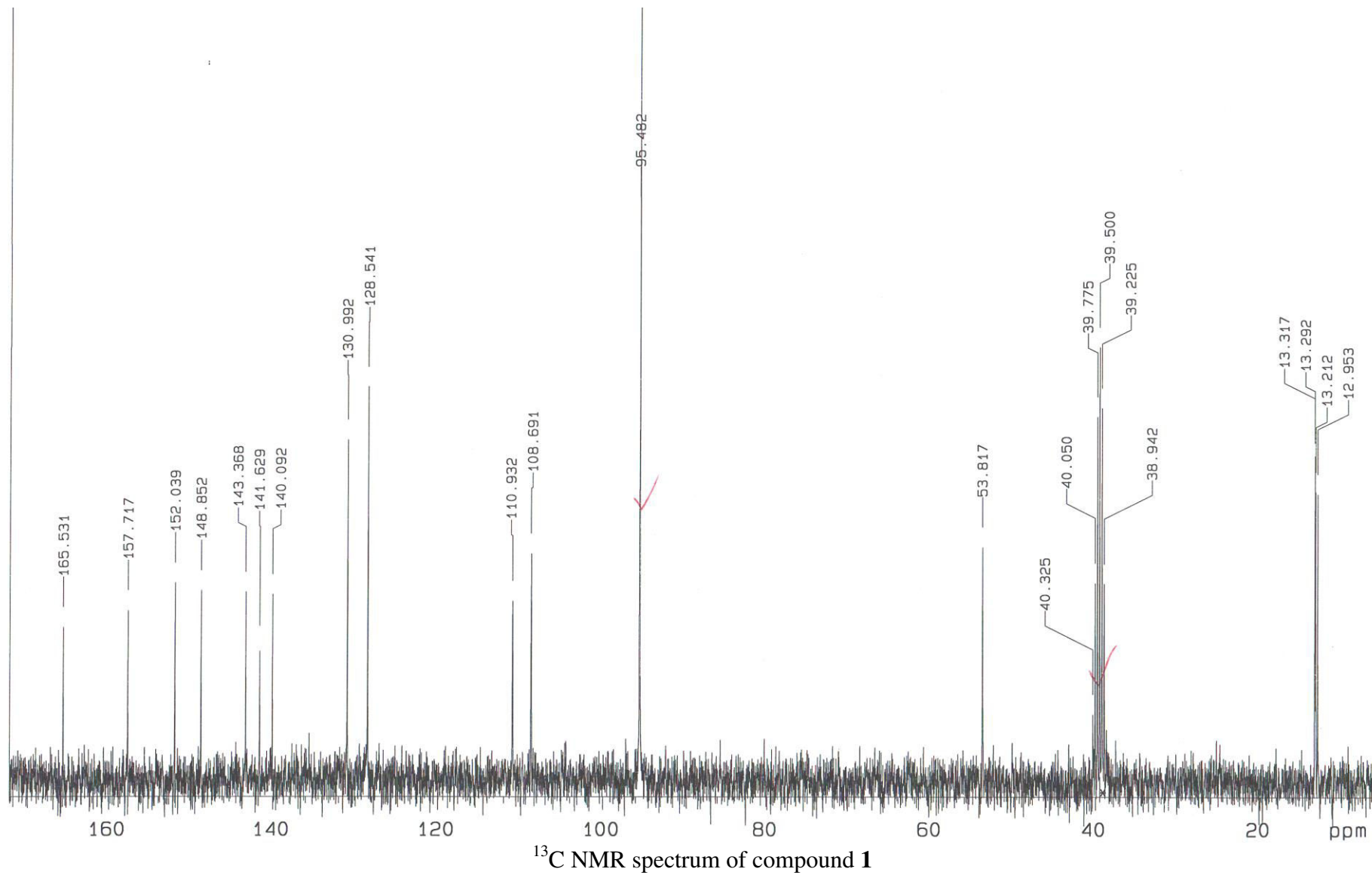
^bRussian-Armenian University, 123, H. Emin str., Yerevan, 0051, Armenia

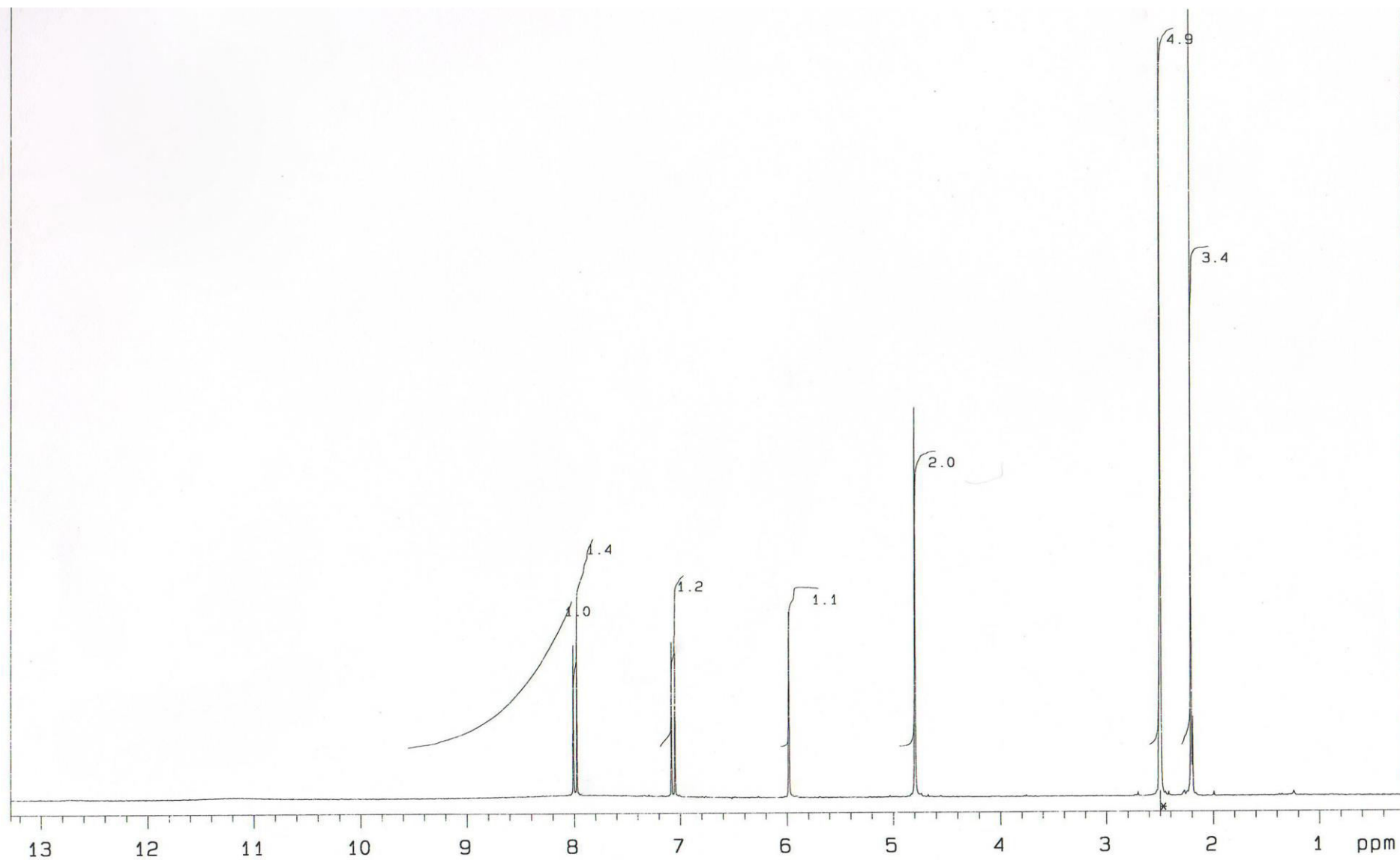
**e-mail: ayengoyan@mail.ru*

¹H and ¹³C NMR spectra and biological activities of compounds **1-15**

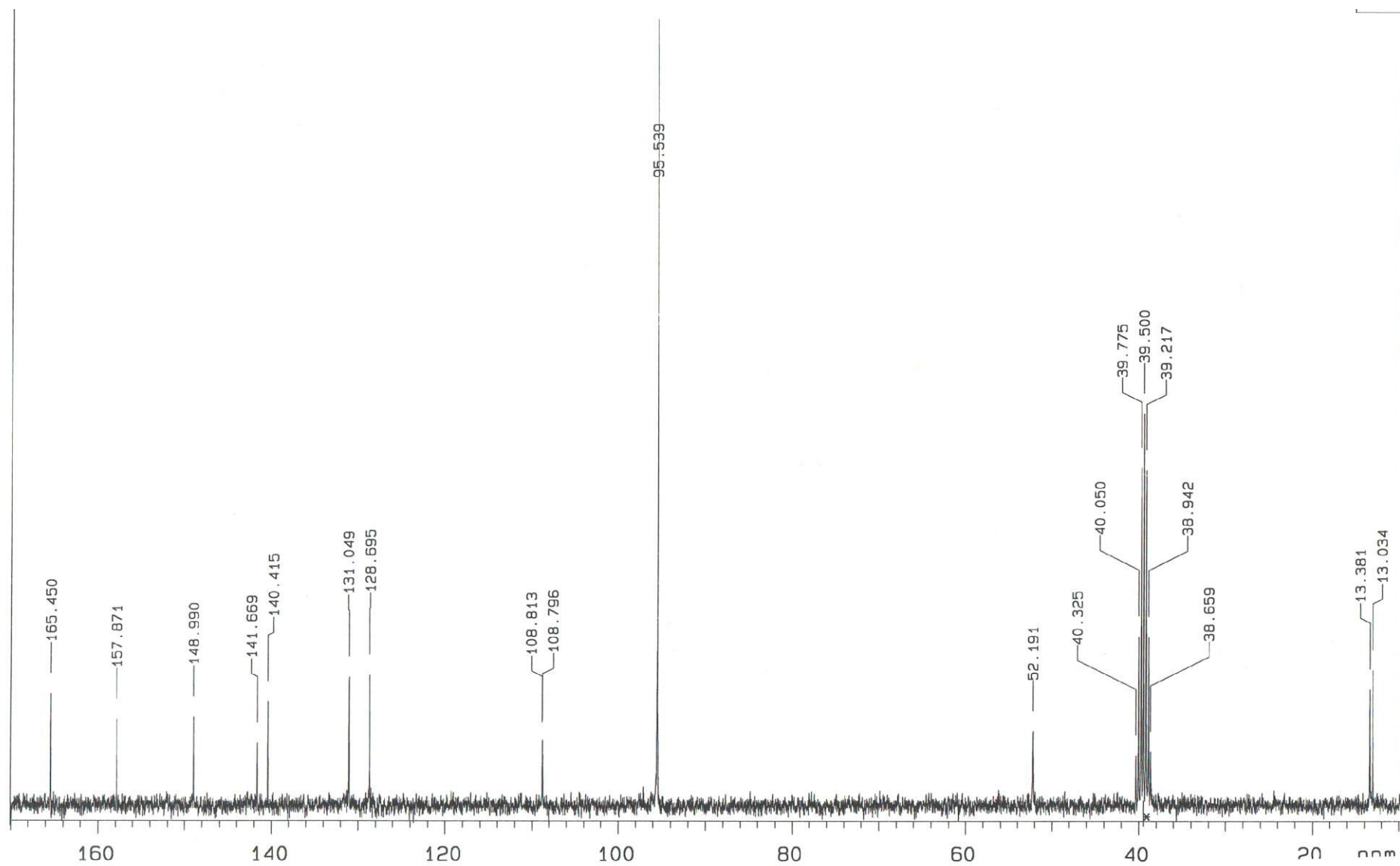


^1H NMR spectrum of compound 1

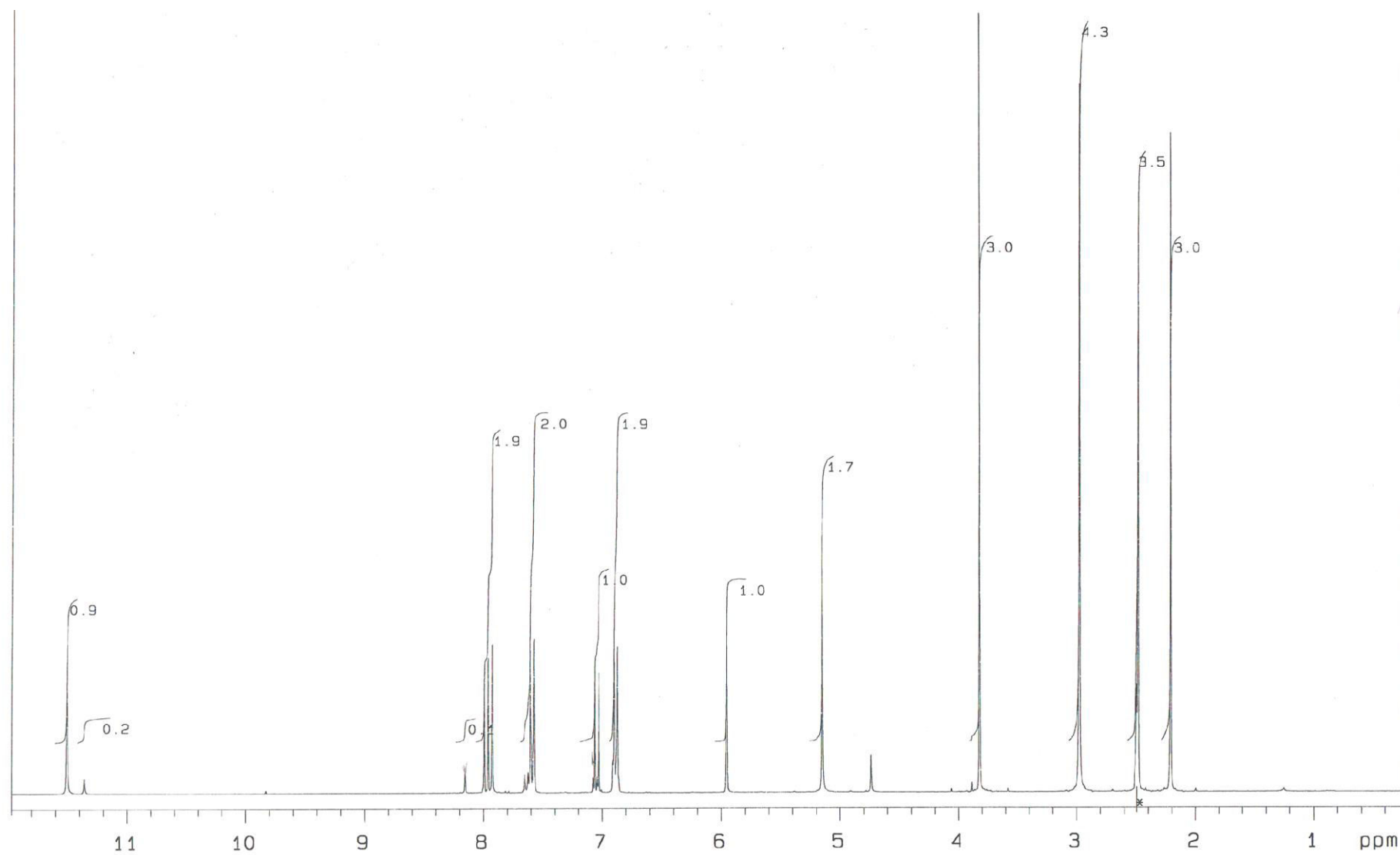




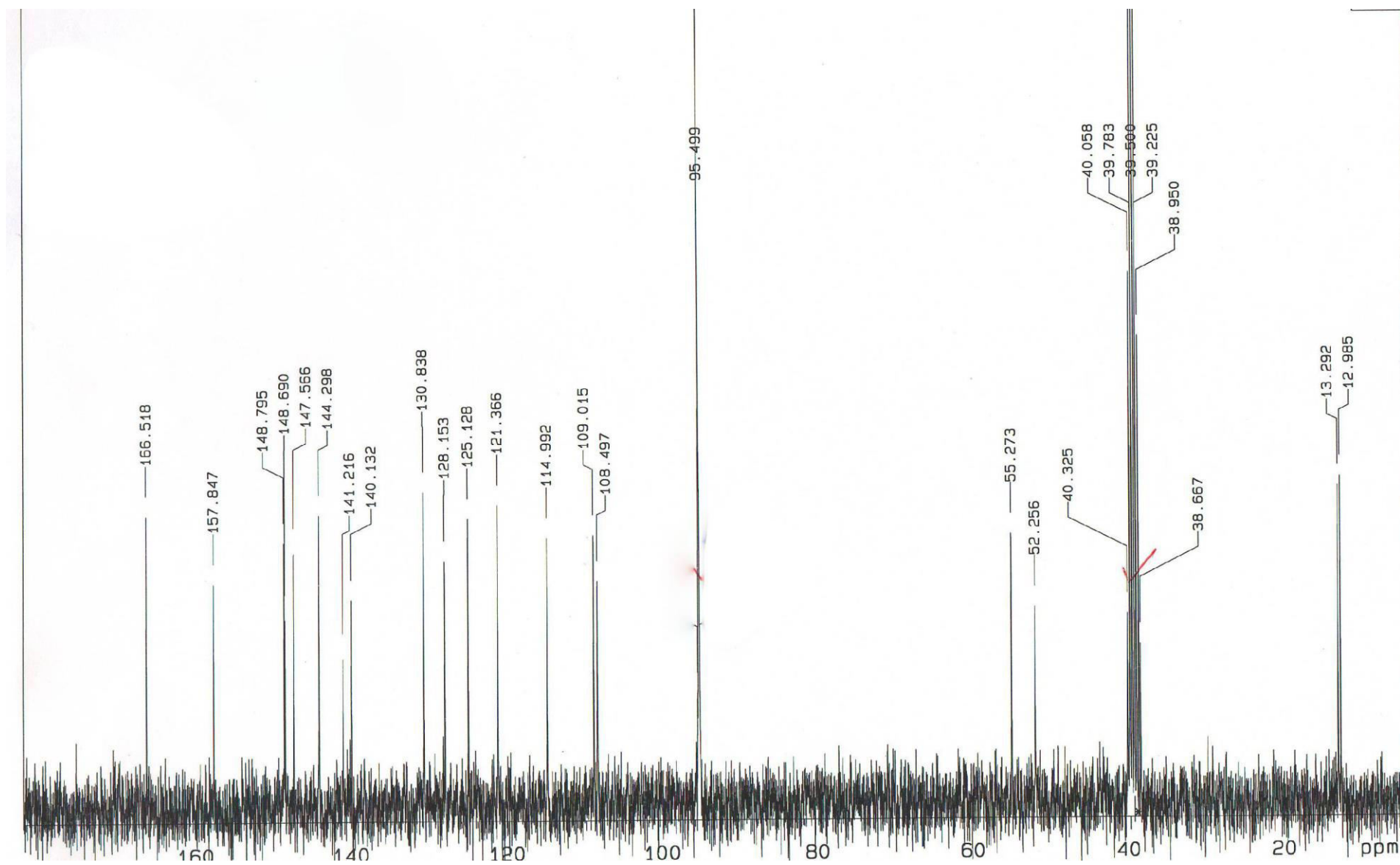
^1H NMR spectrum of compound **2**



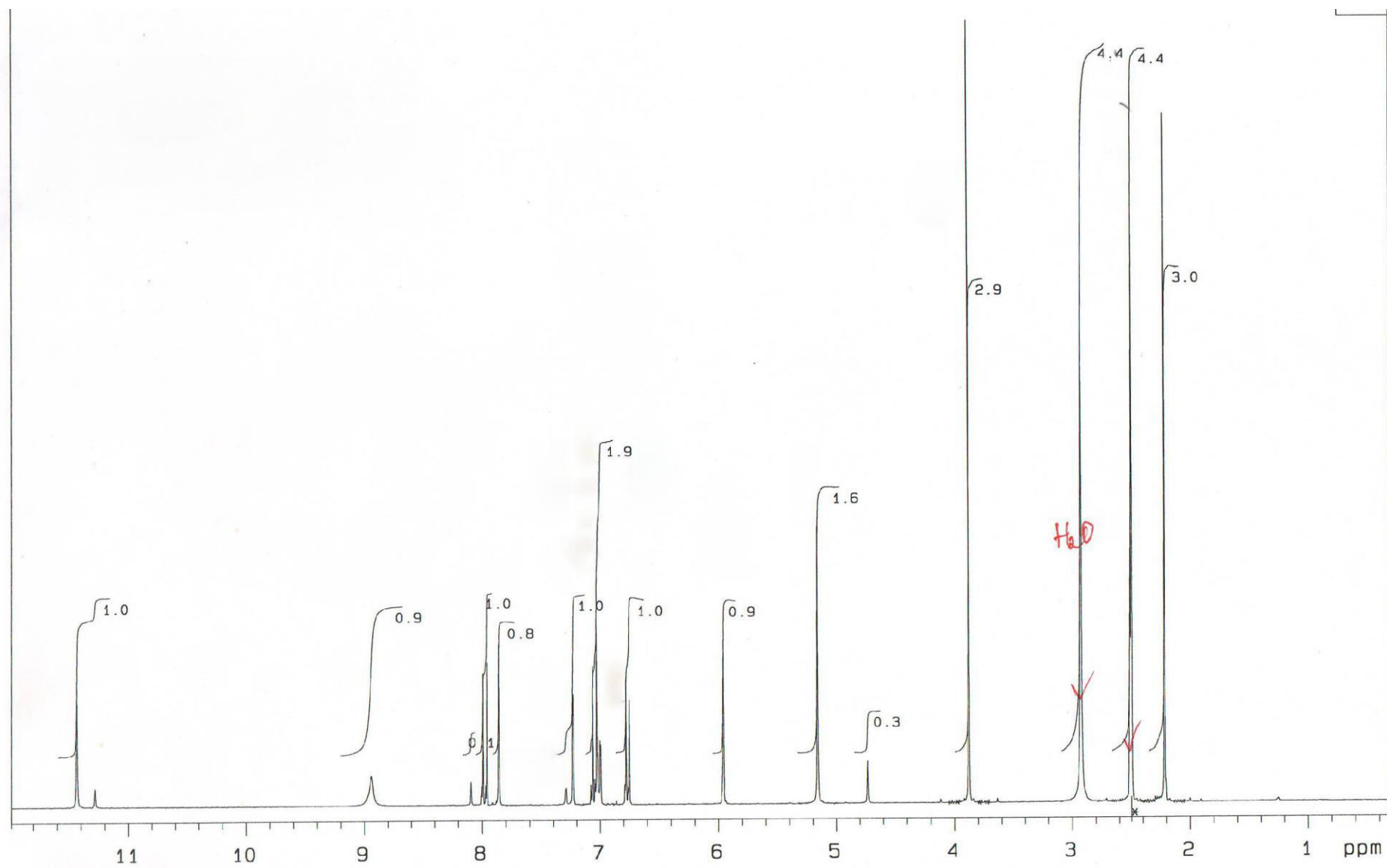
^{13}C NMR spectrum of compound 2



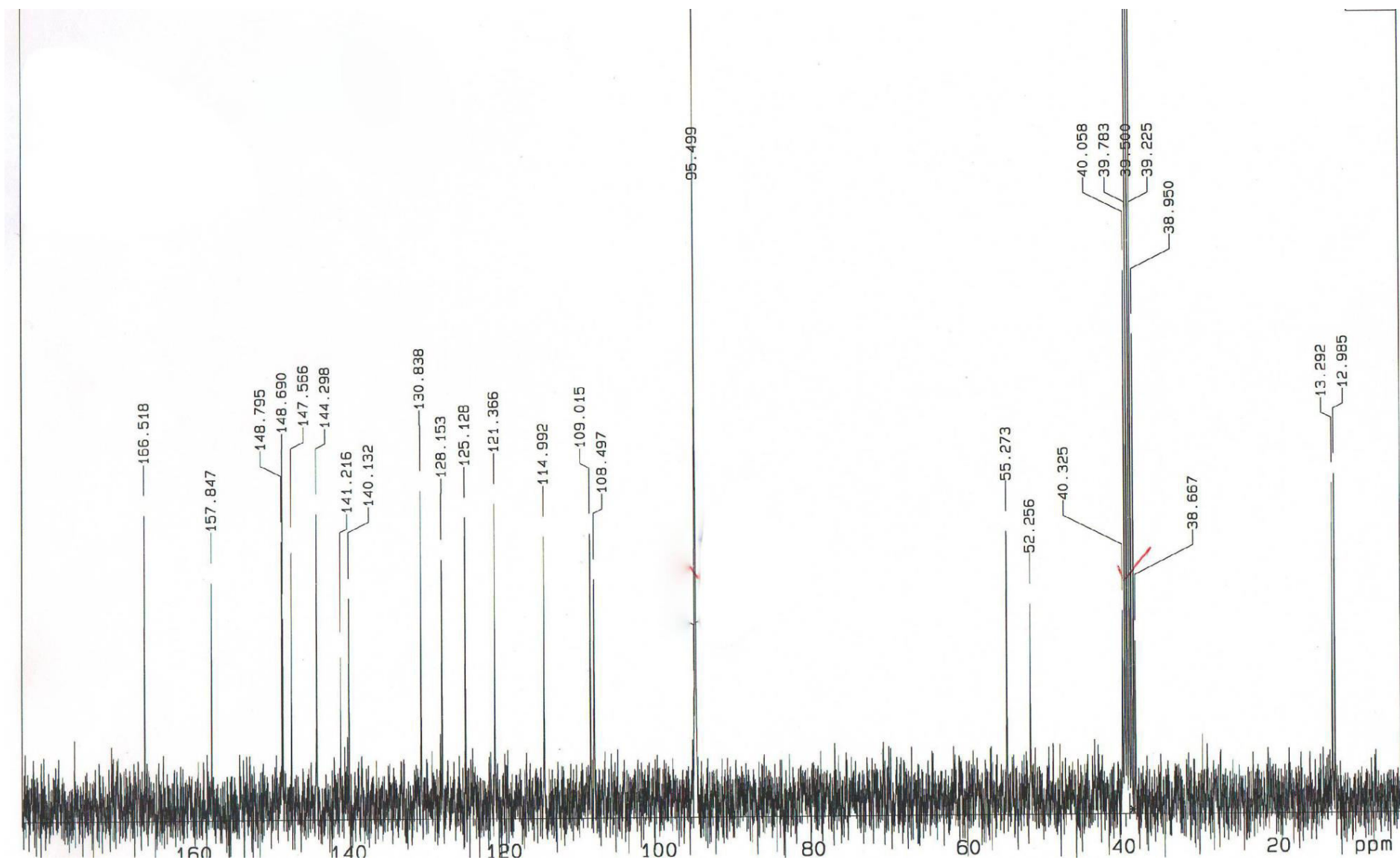
^1H NMR spectrum of compound **3a**



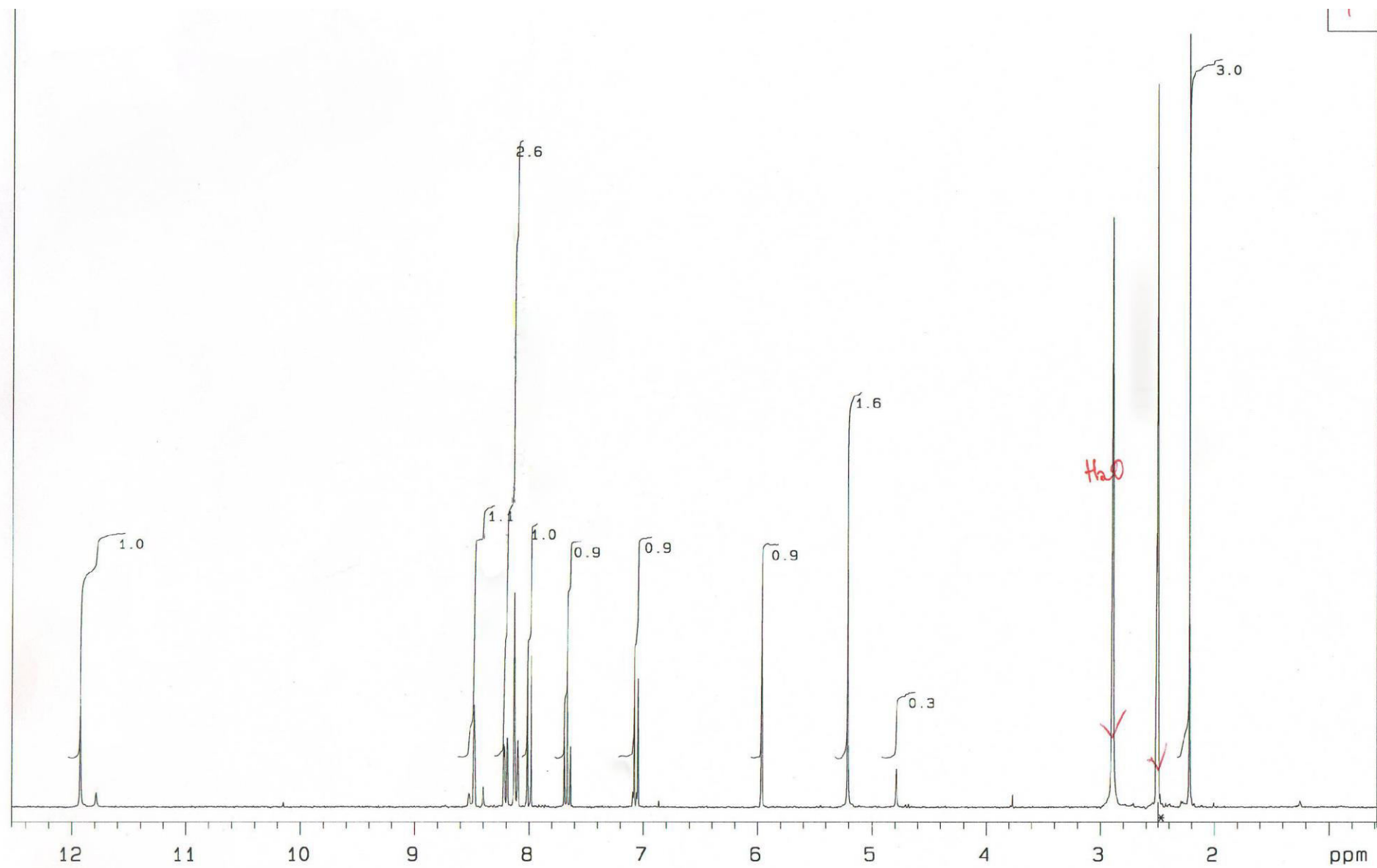
^{13}C NMR spectrum of compound **3a**



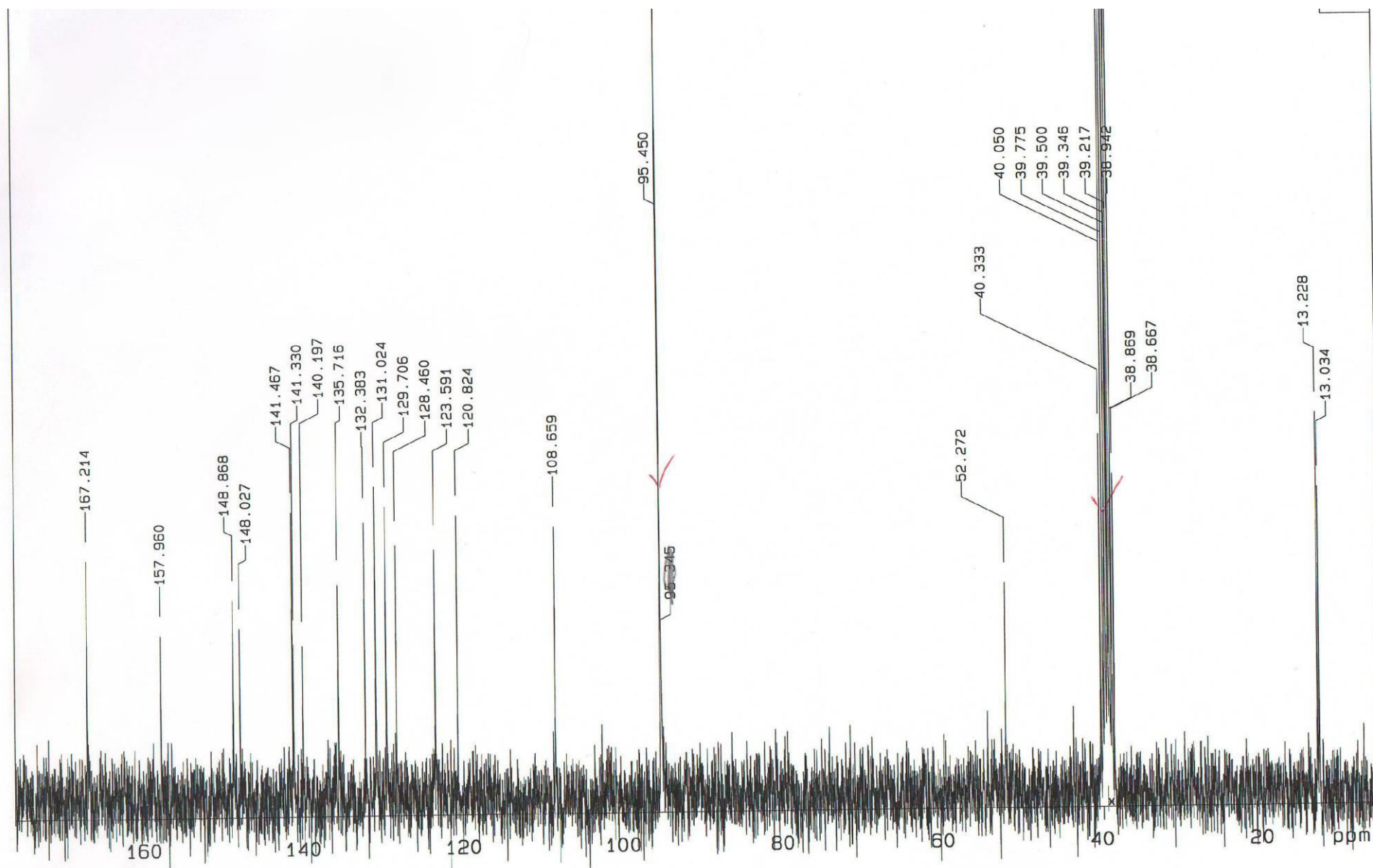
^1H NMR spectrum of compound **3b**



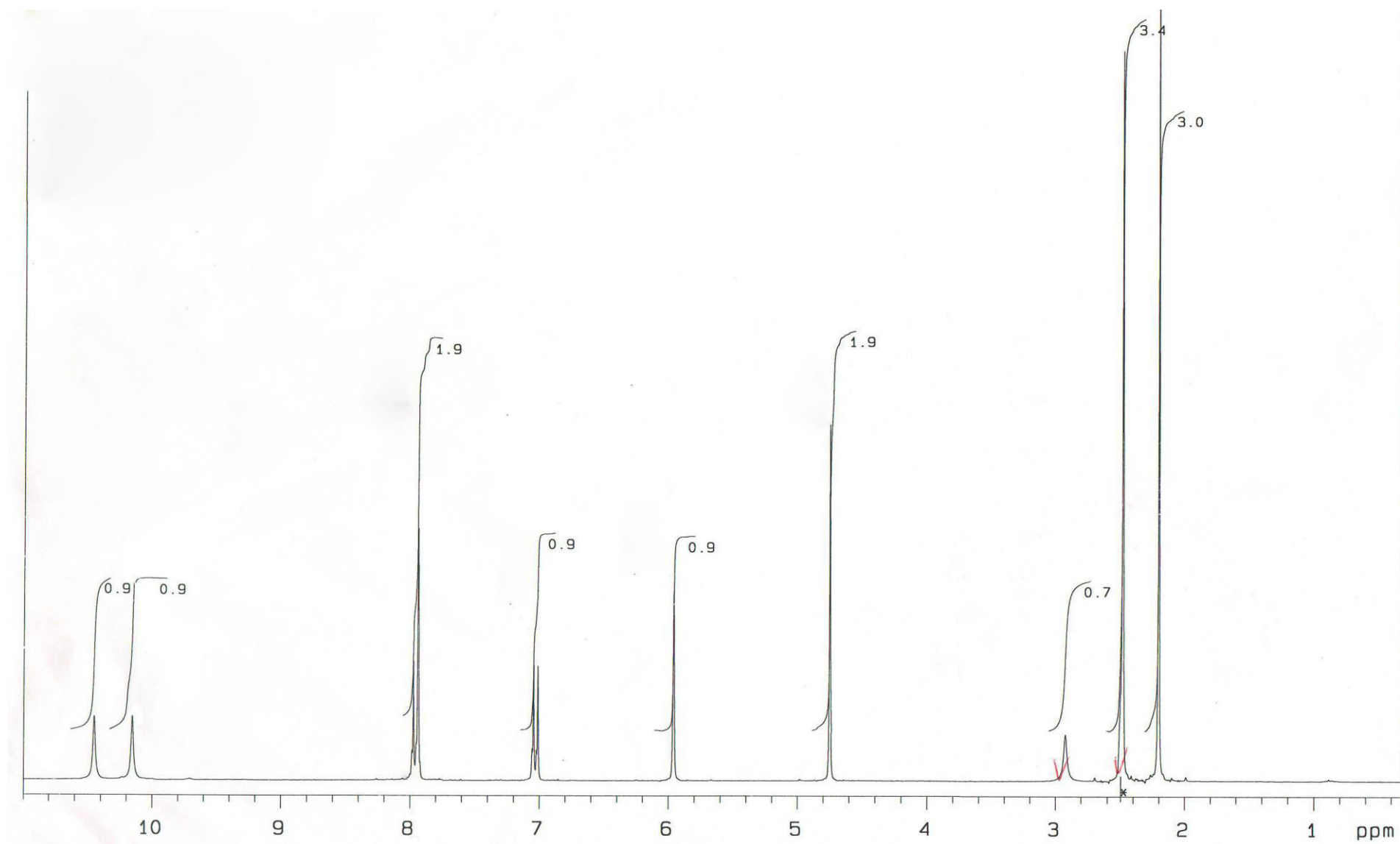
^{13}C NMR spectrum of compound **3b**



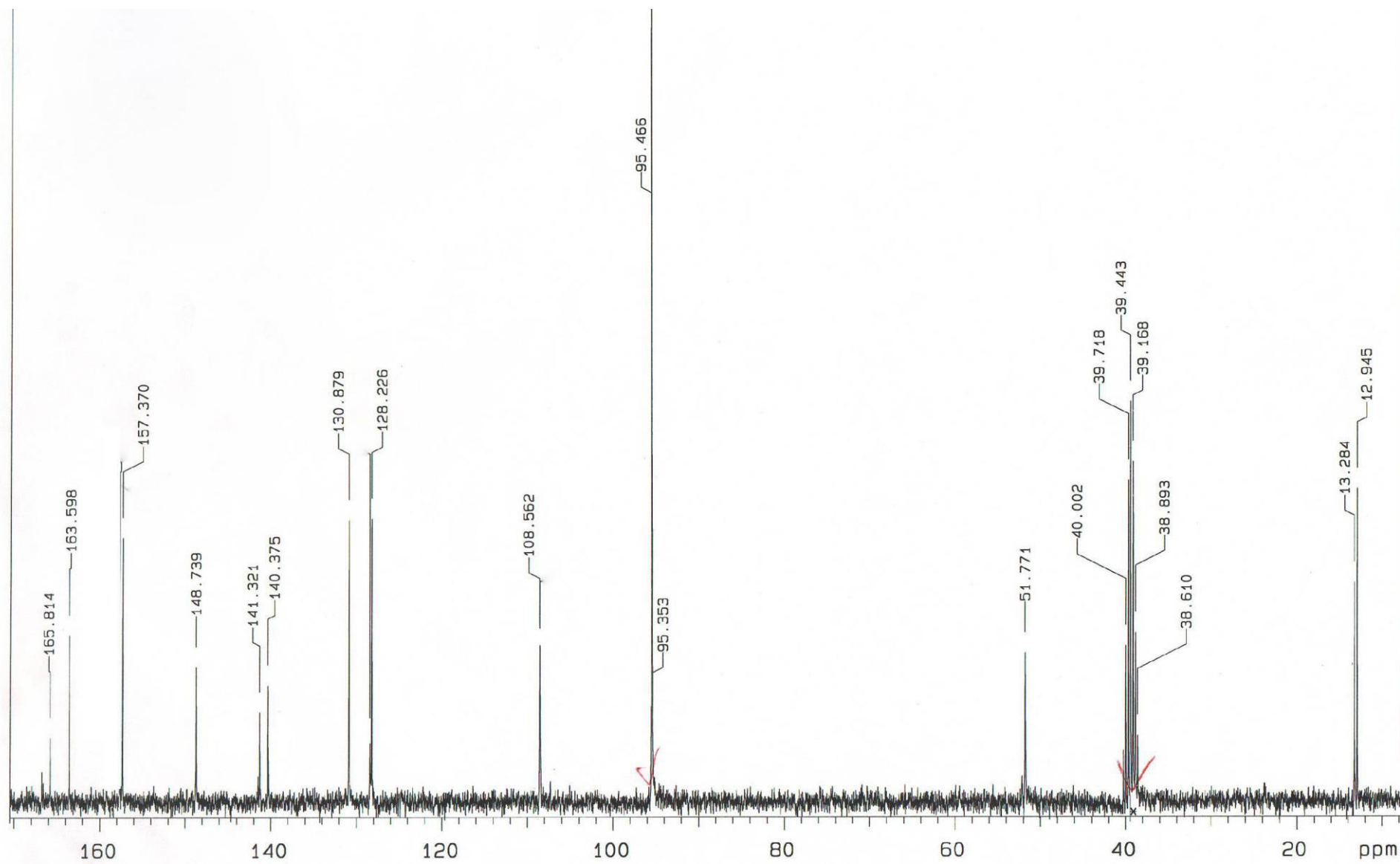
^1H NMR spectrum of compound **3c**



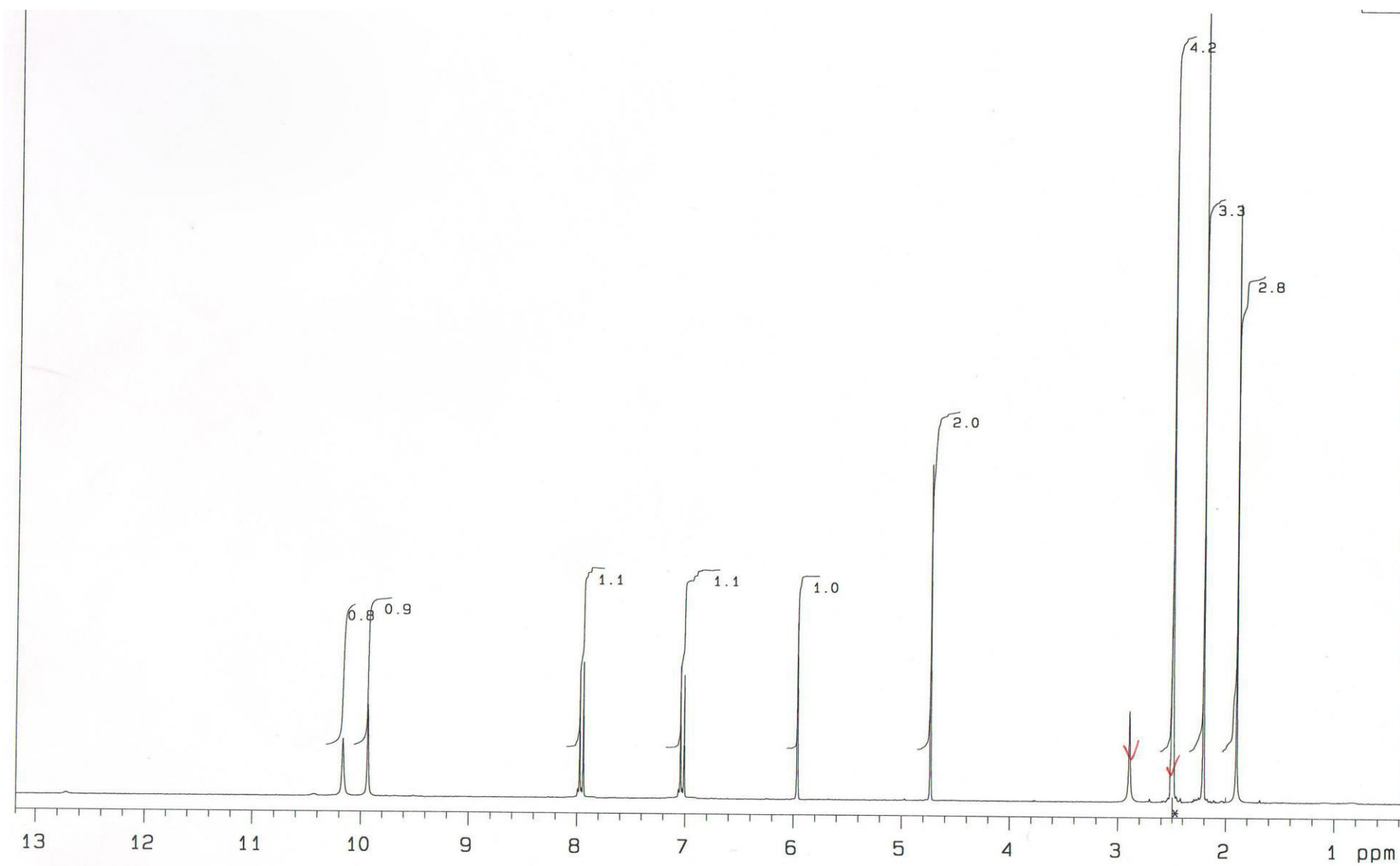
¹³C NMR spectrum of compound **3c**



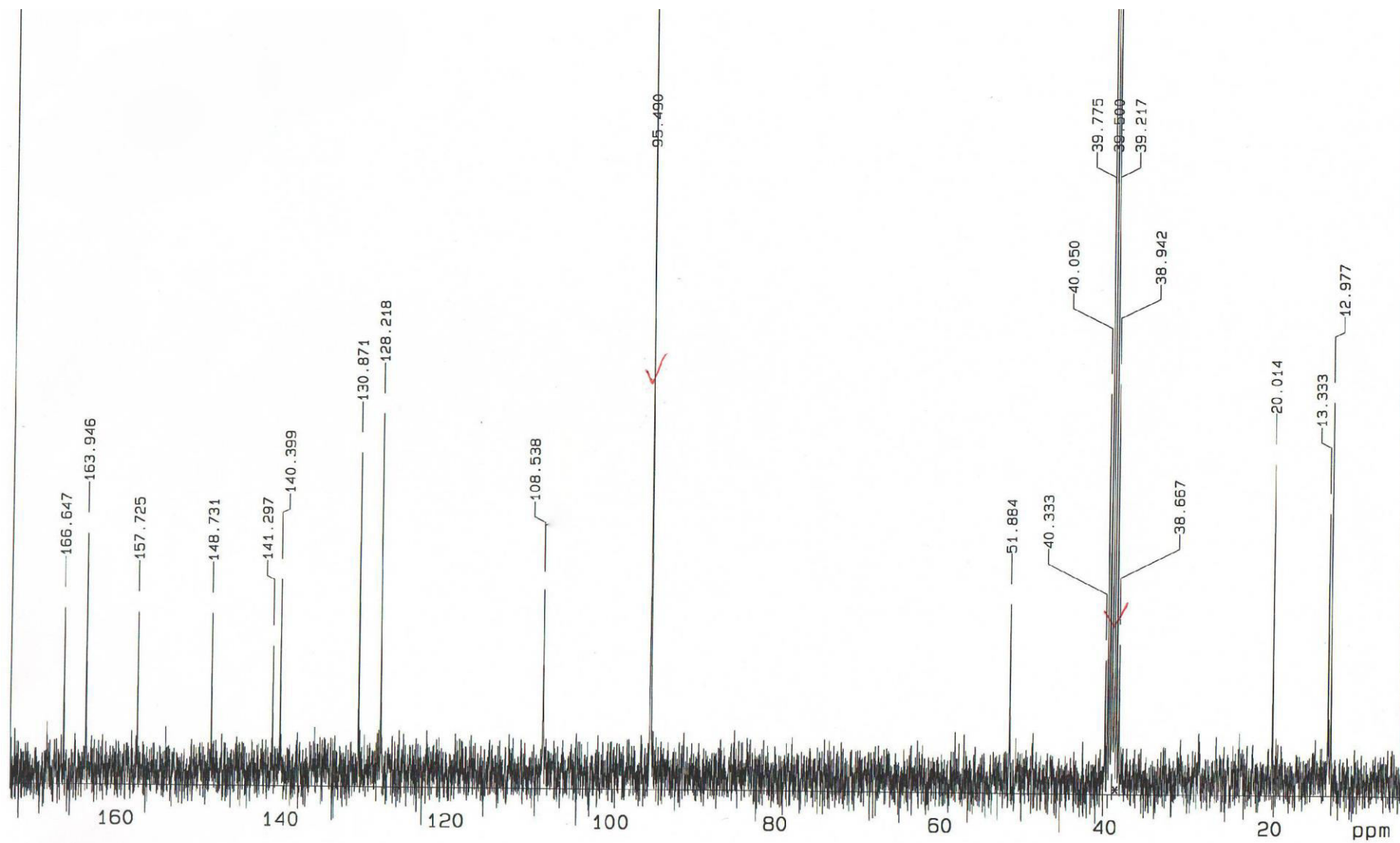
^1H NMR spectrum of compound **4a**



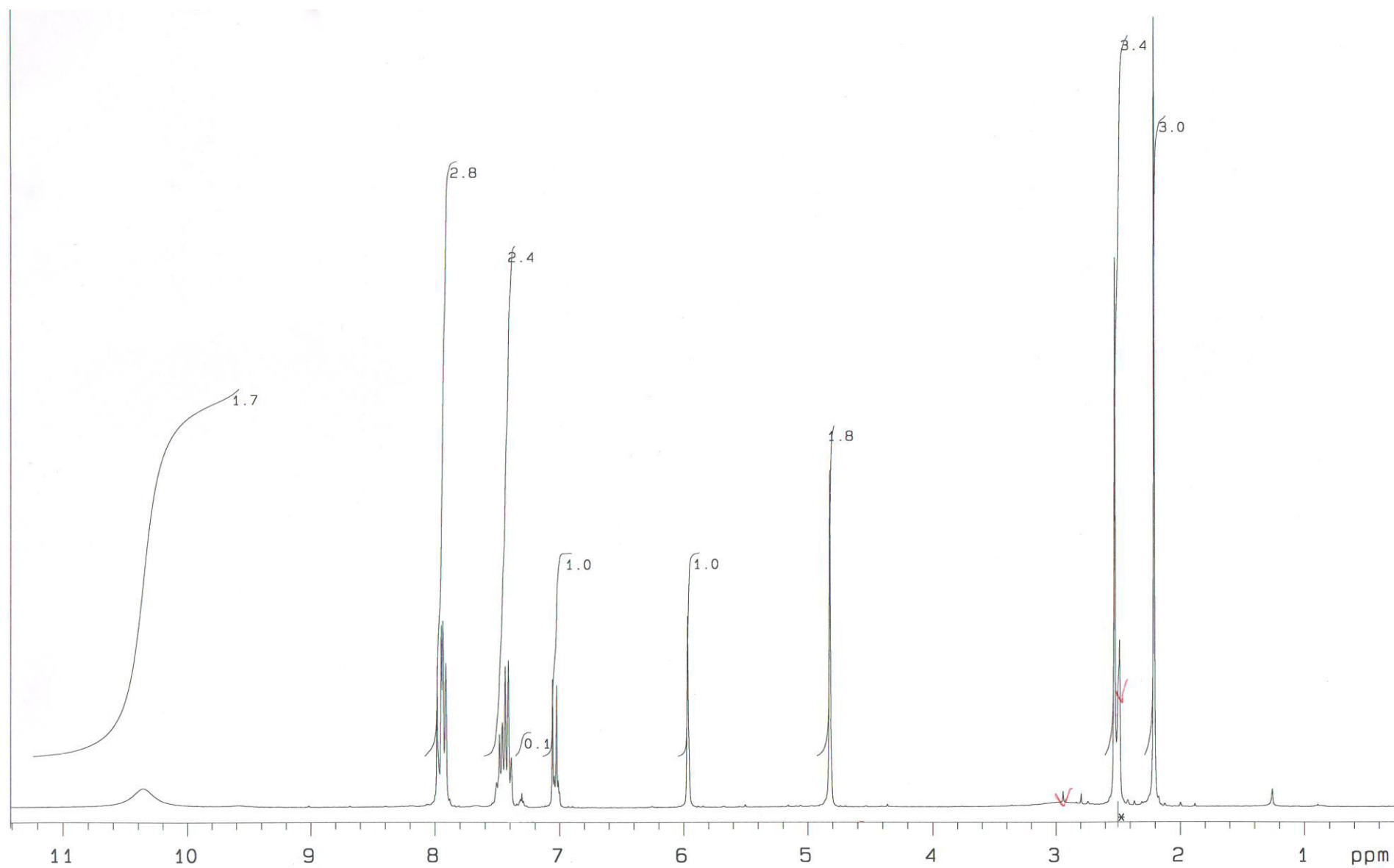
^{13}C NMR spectrum of compound **4a**



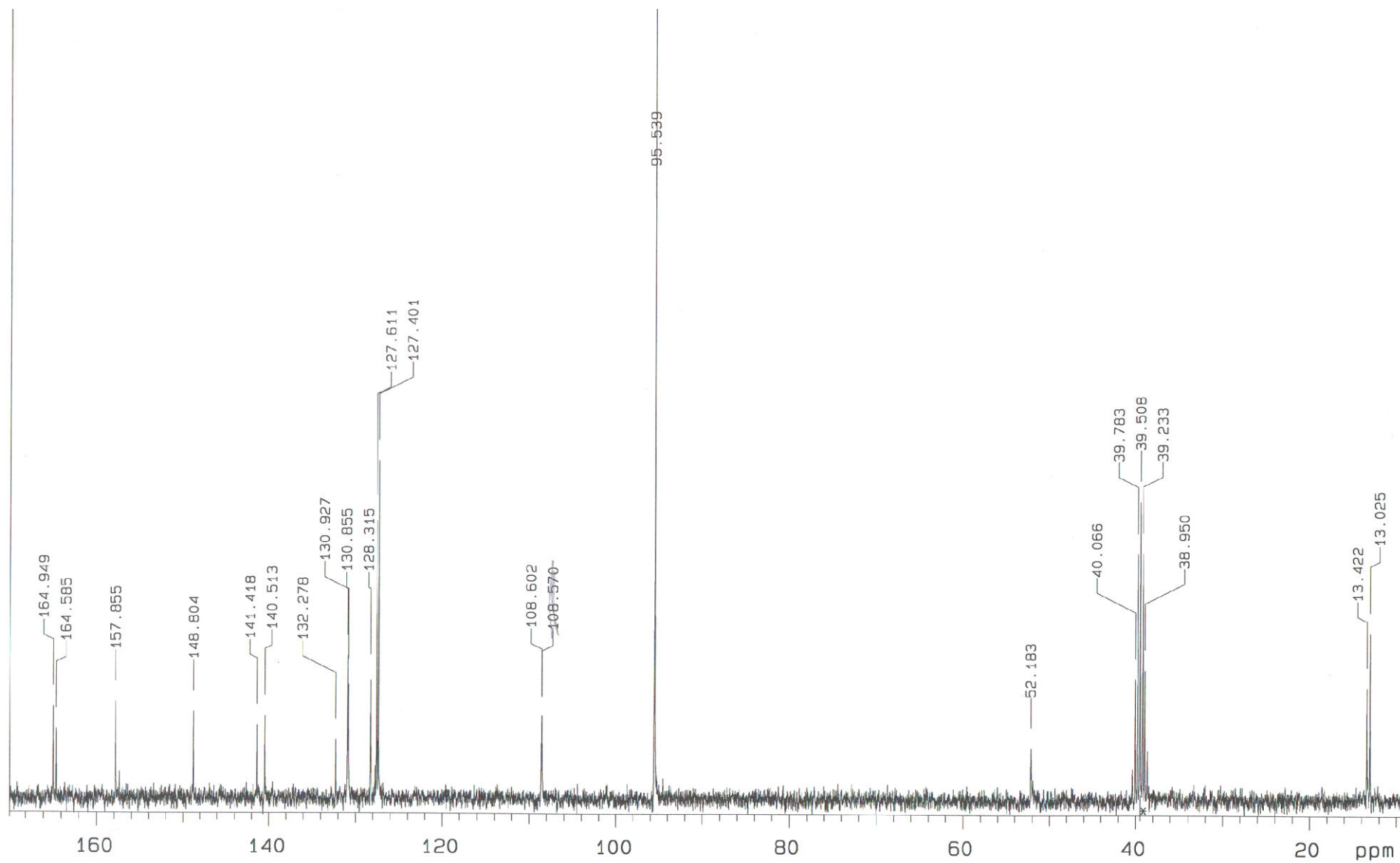
^1H NMR spectrum of compound **4b**



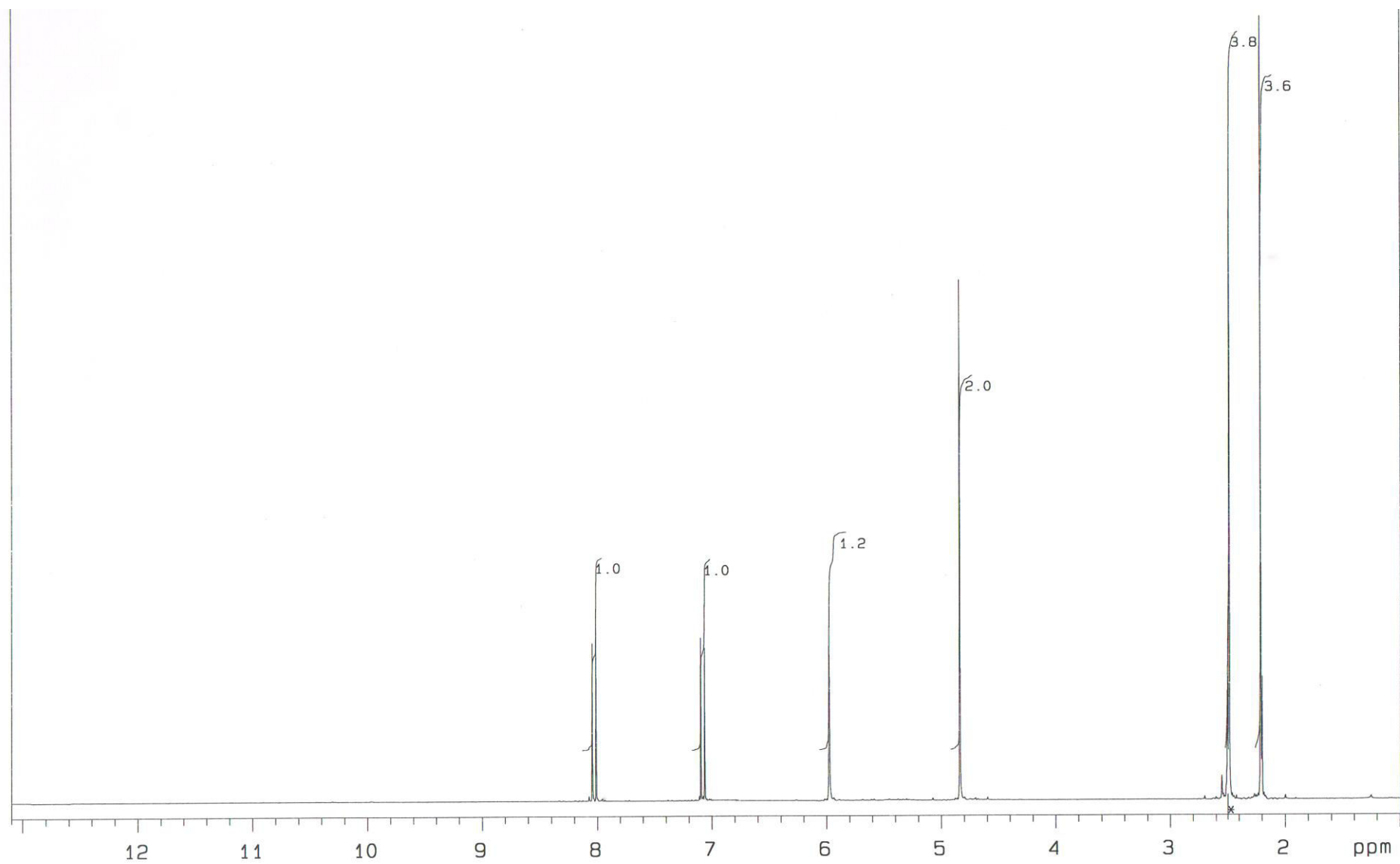
^{13}C NMR spectrum of compound **4b**



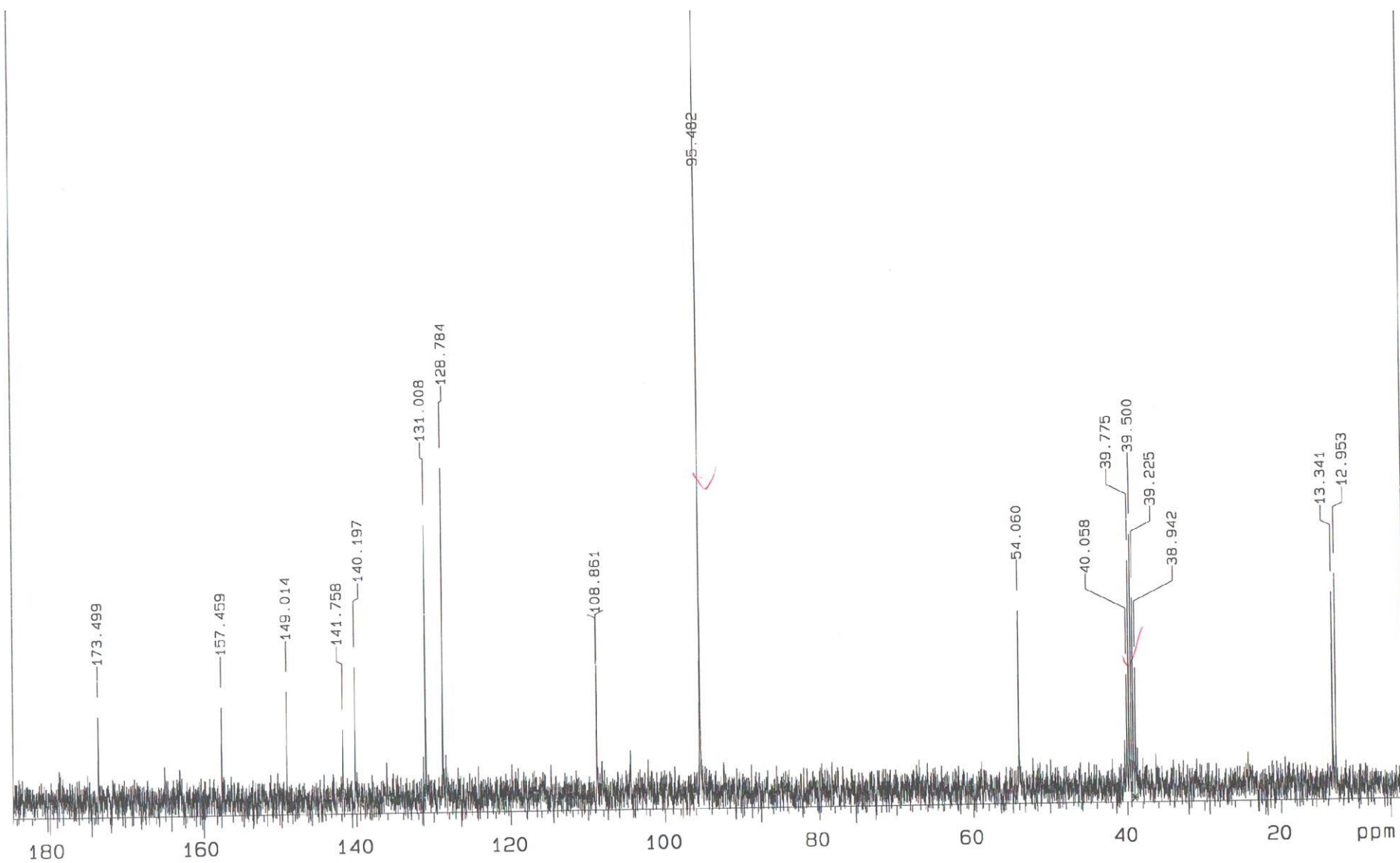
^1H NMR spectrum of compound 5



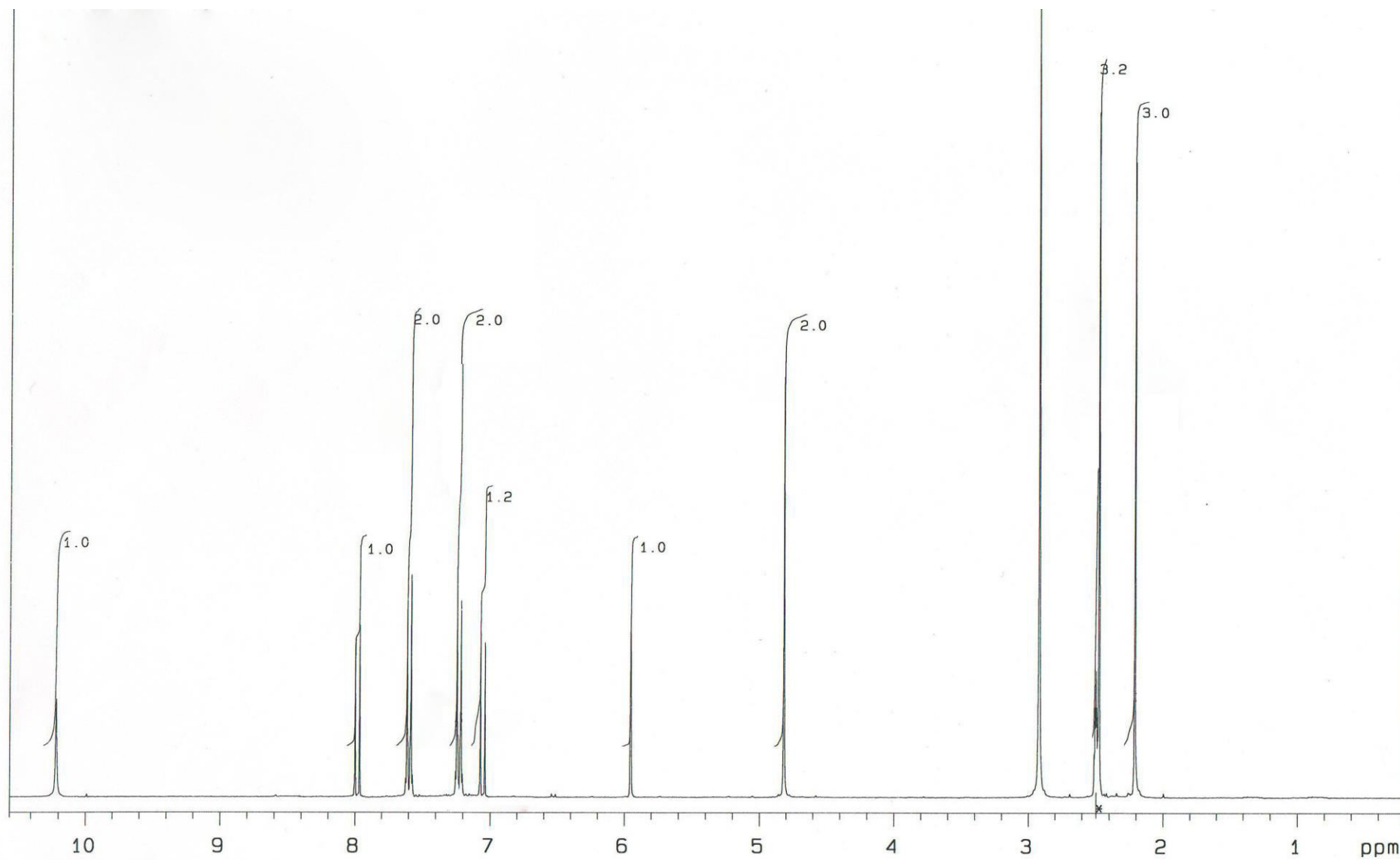
^{13}C NMR spectrum of compound 5



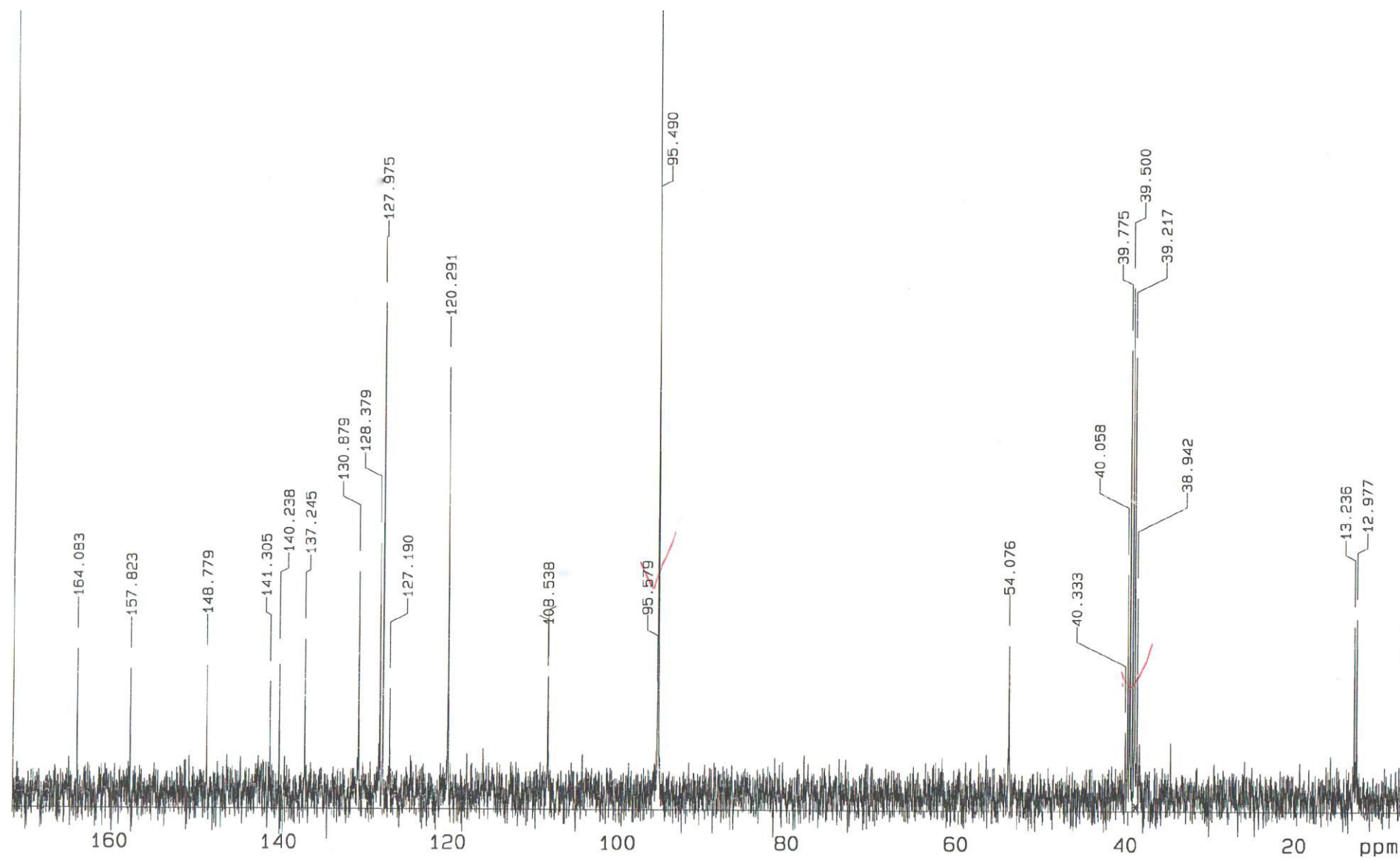
^1H NMR spectrum of compound 6



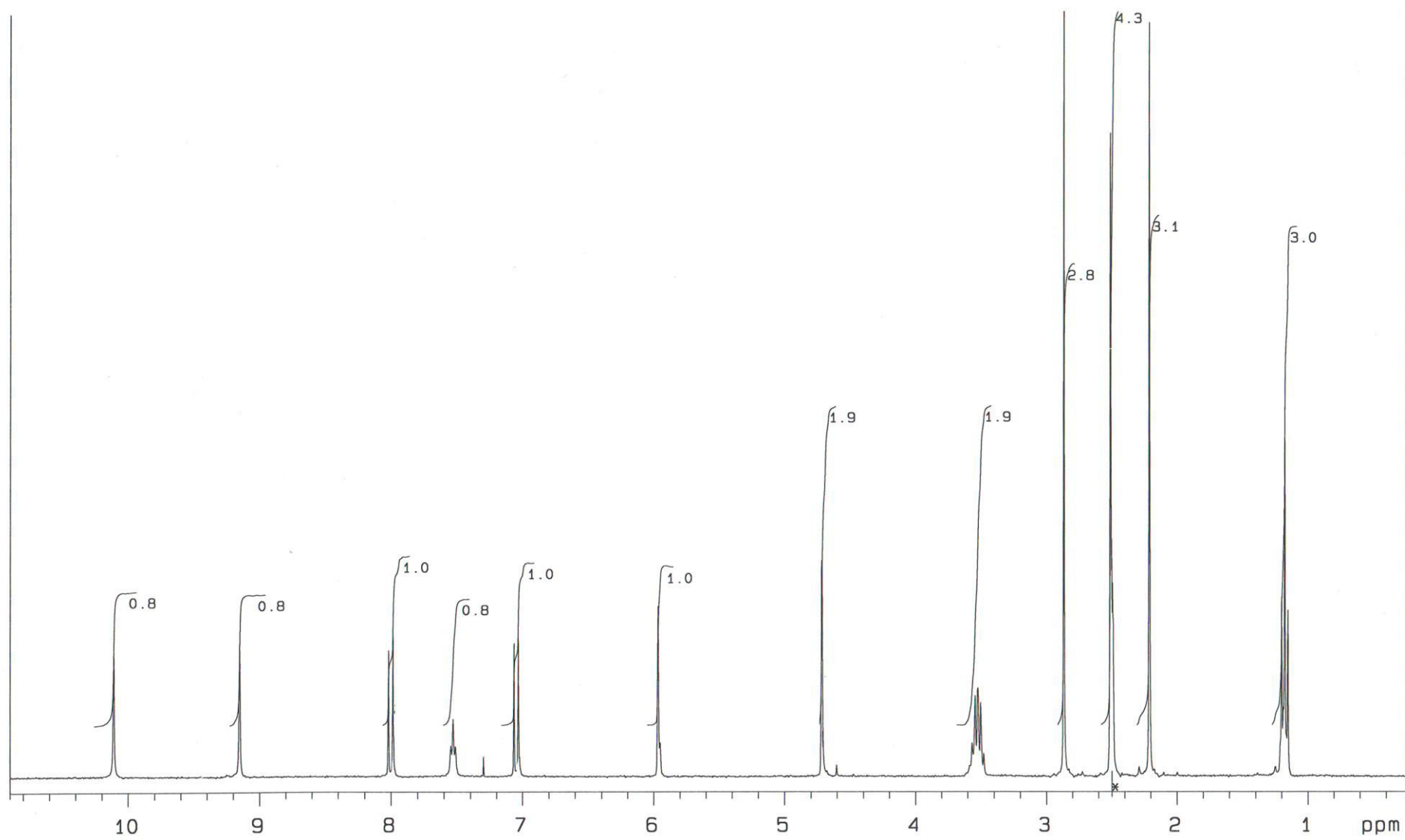
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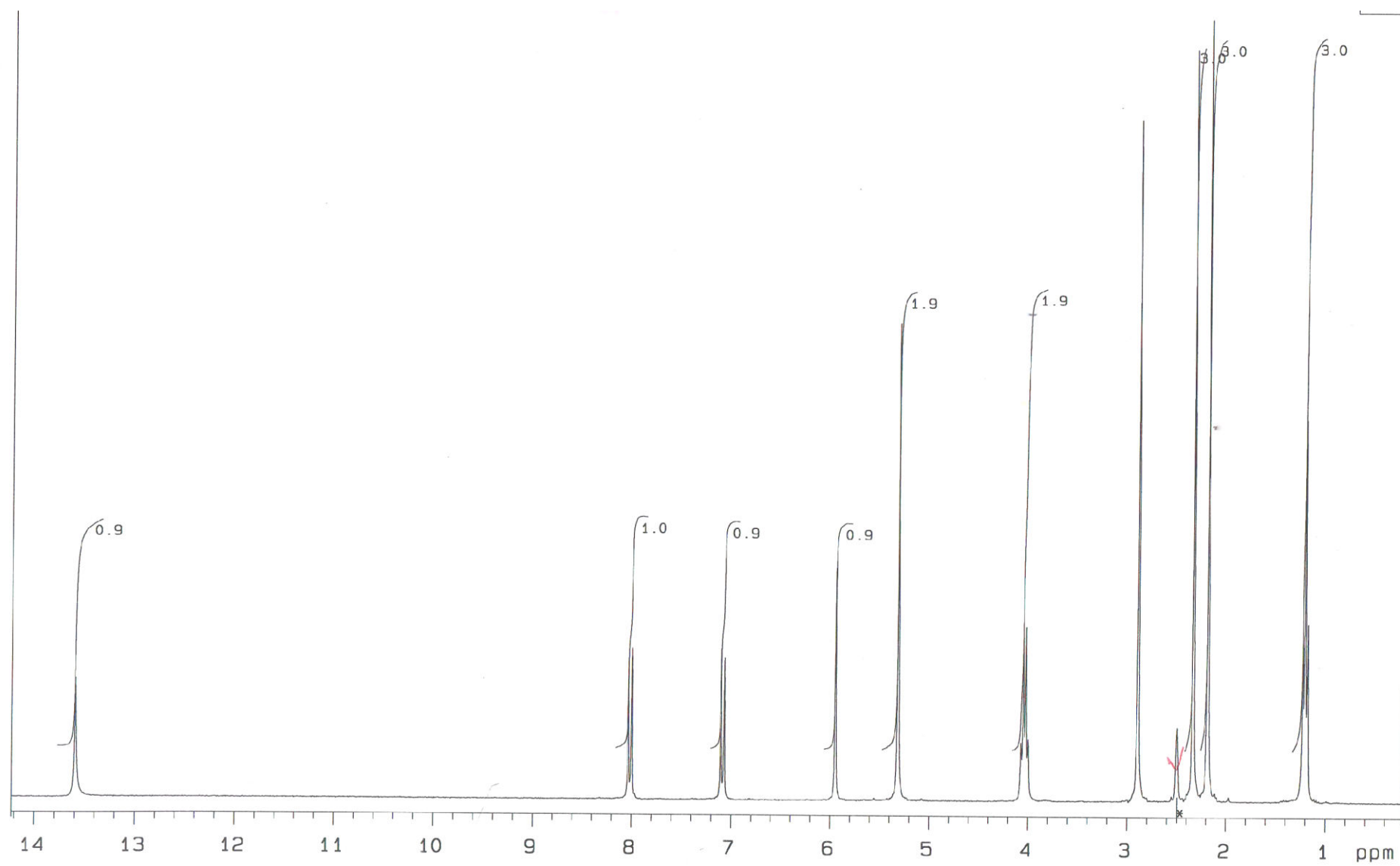
^1H NMR spectrum of compound 7



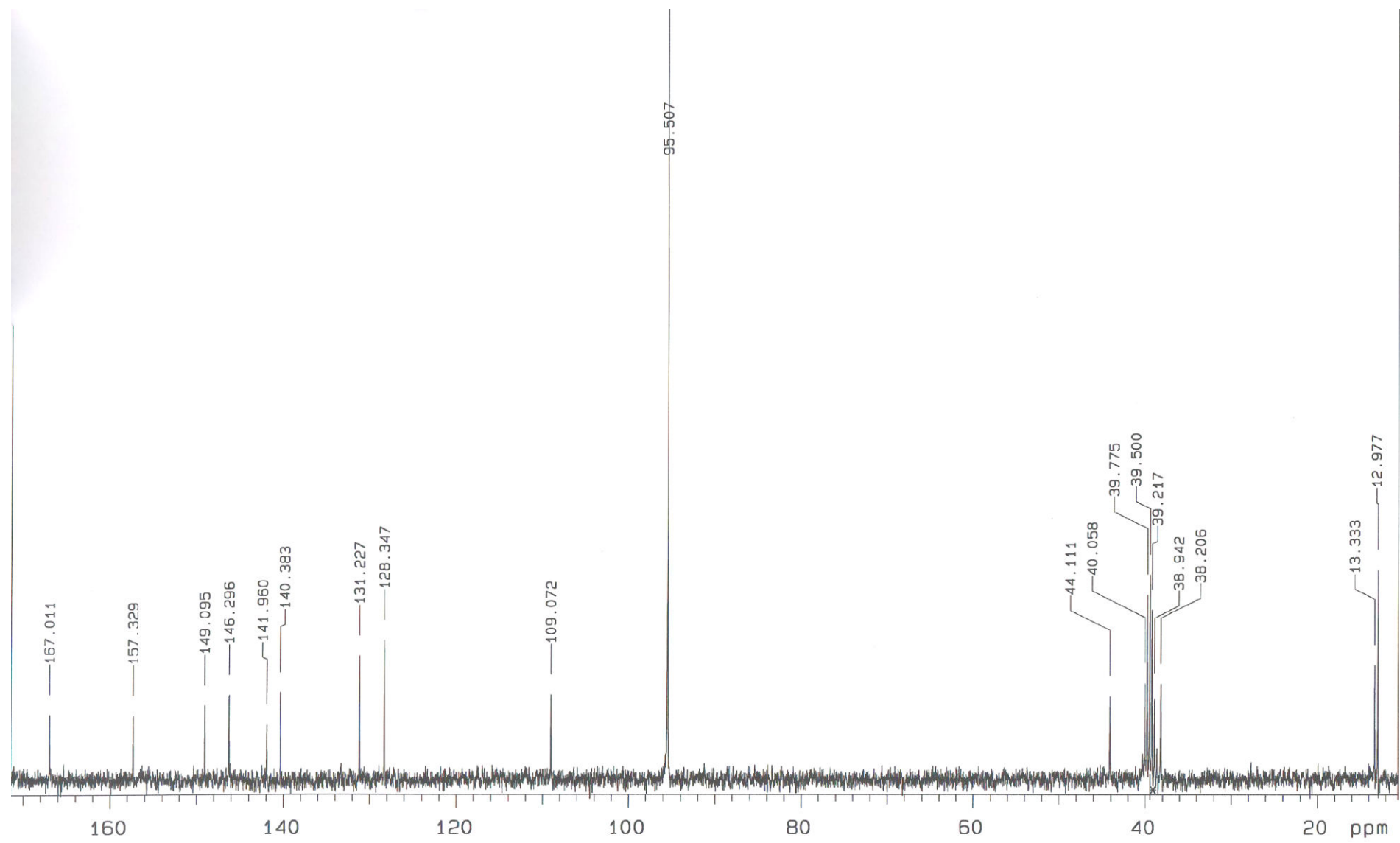
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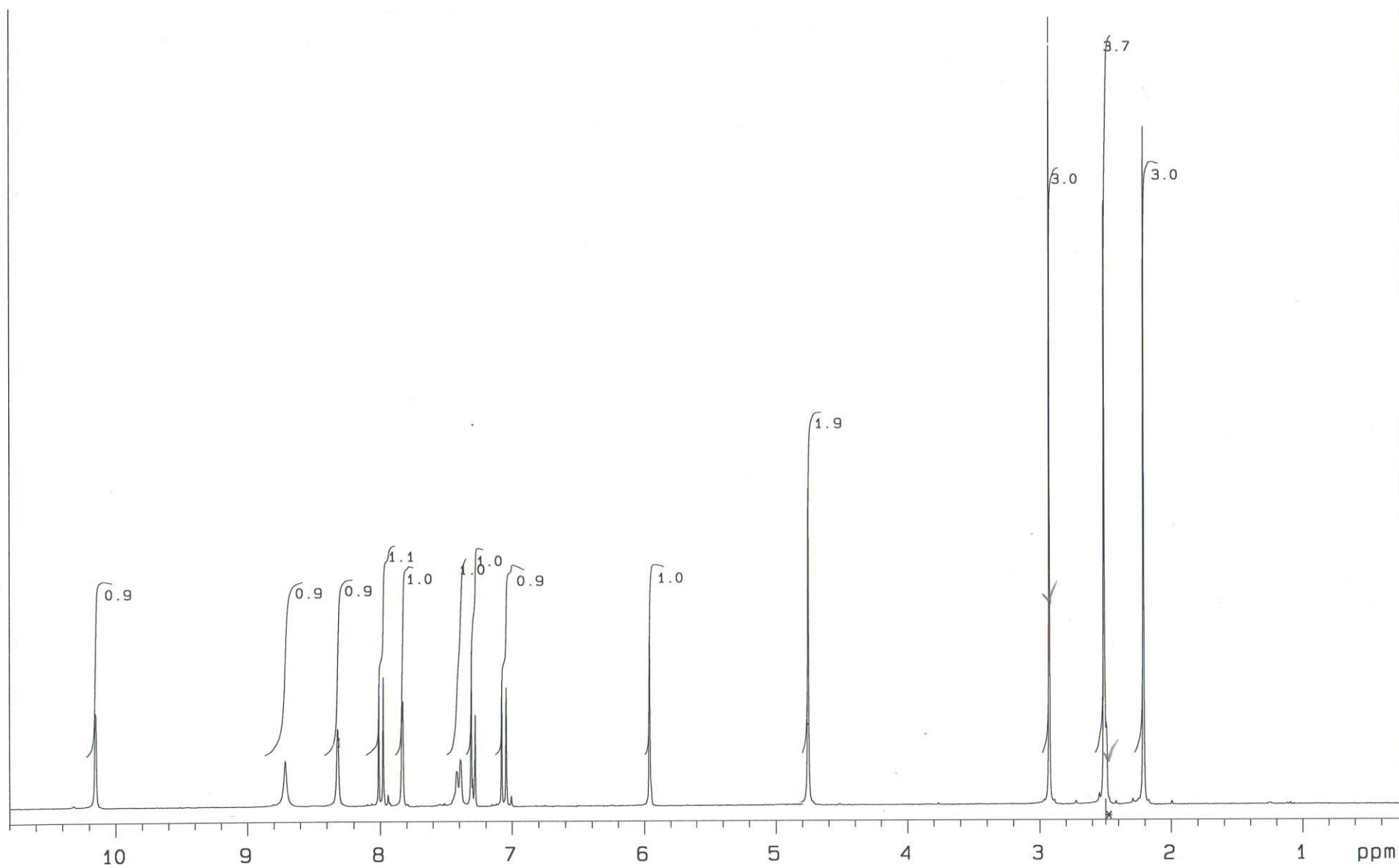
^1H NMR spectrum of compound **8**



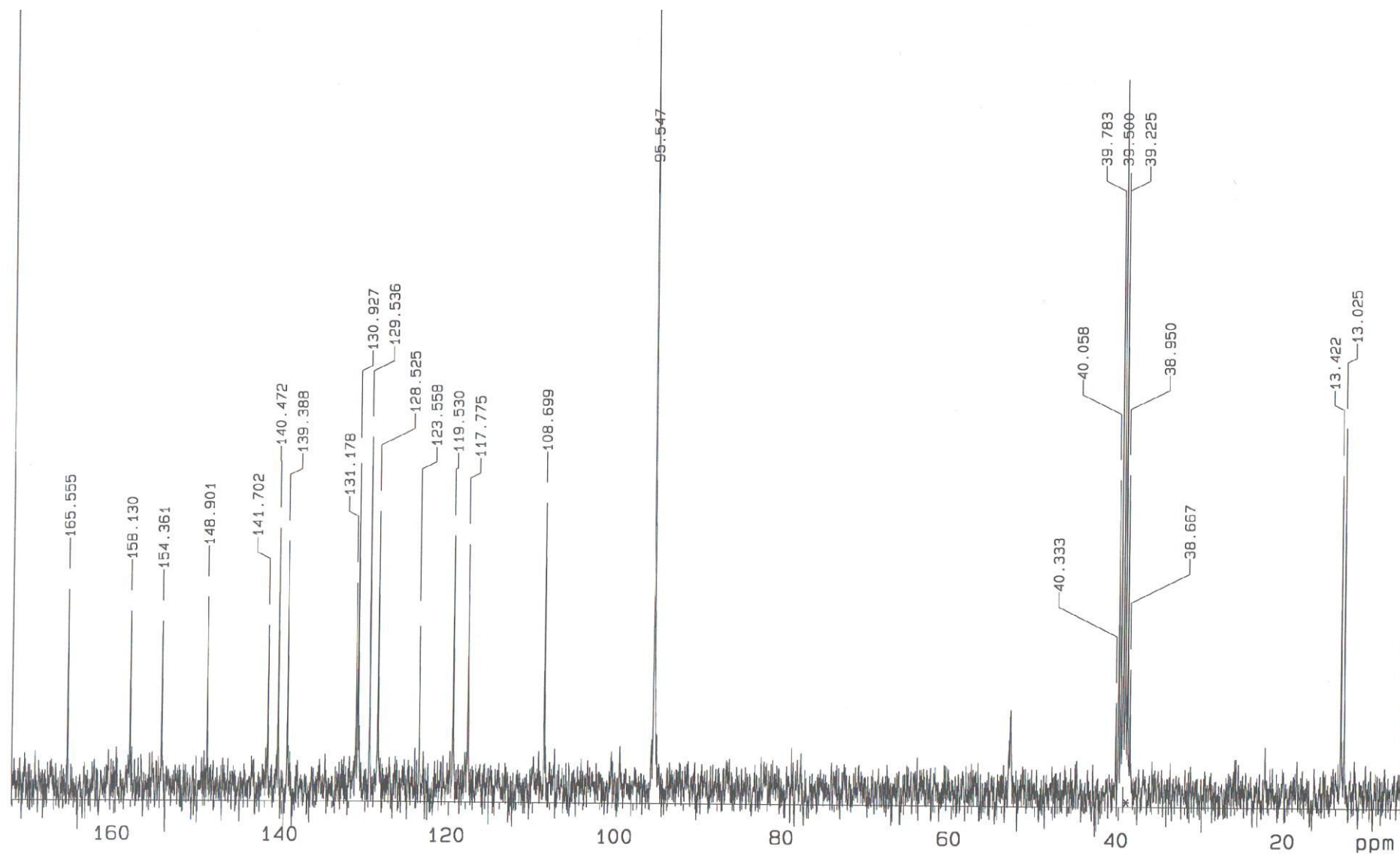
^1H NMR spectrum of compound **9**



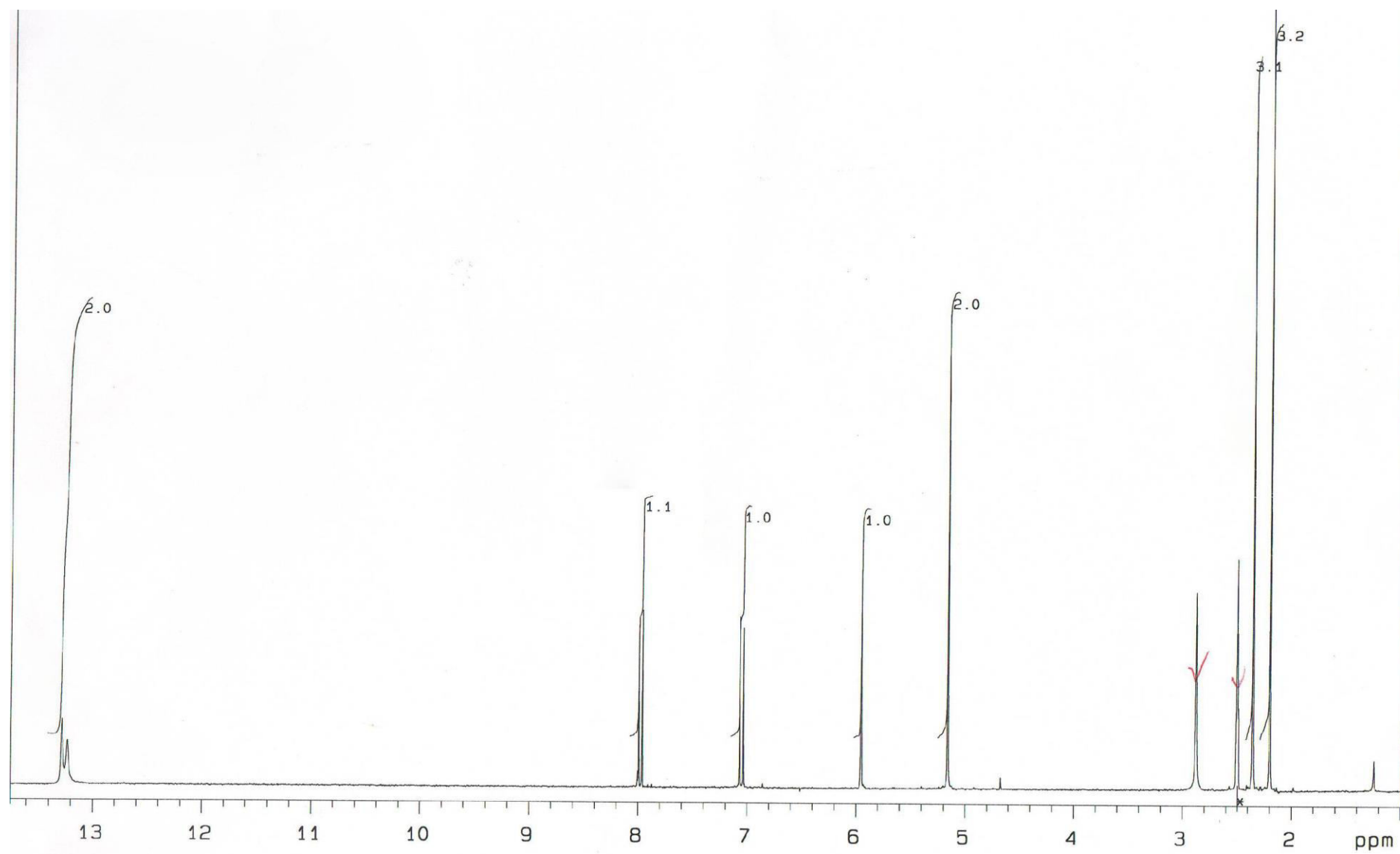
^{13}C NMR spectrum of compound **9**



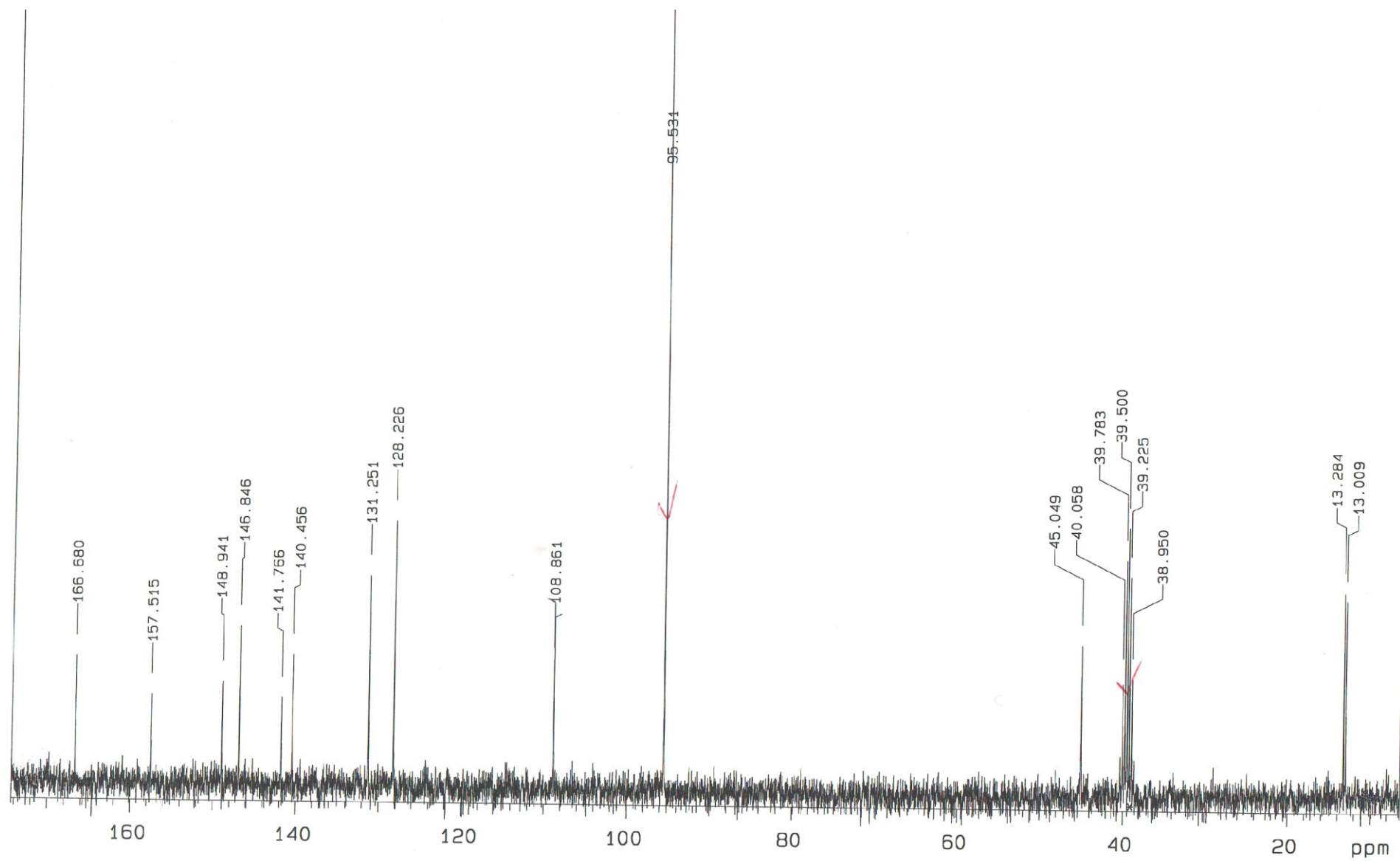
^1H NMR spectrum of compound **10**



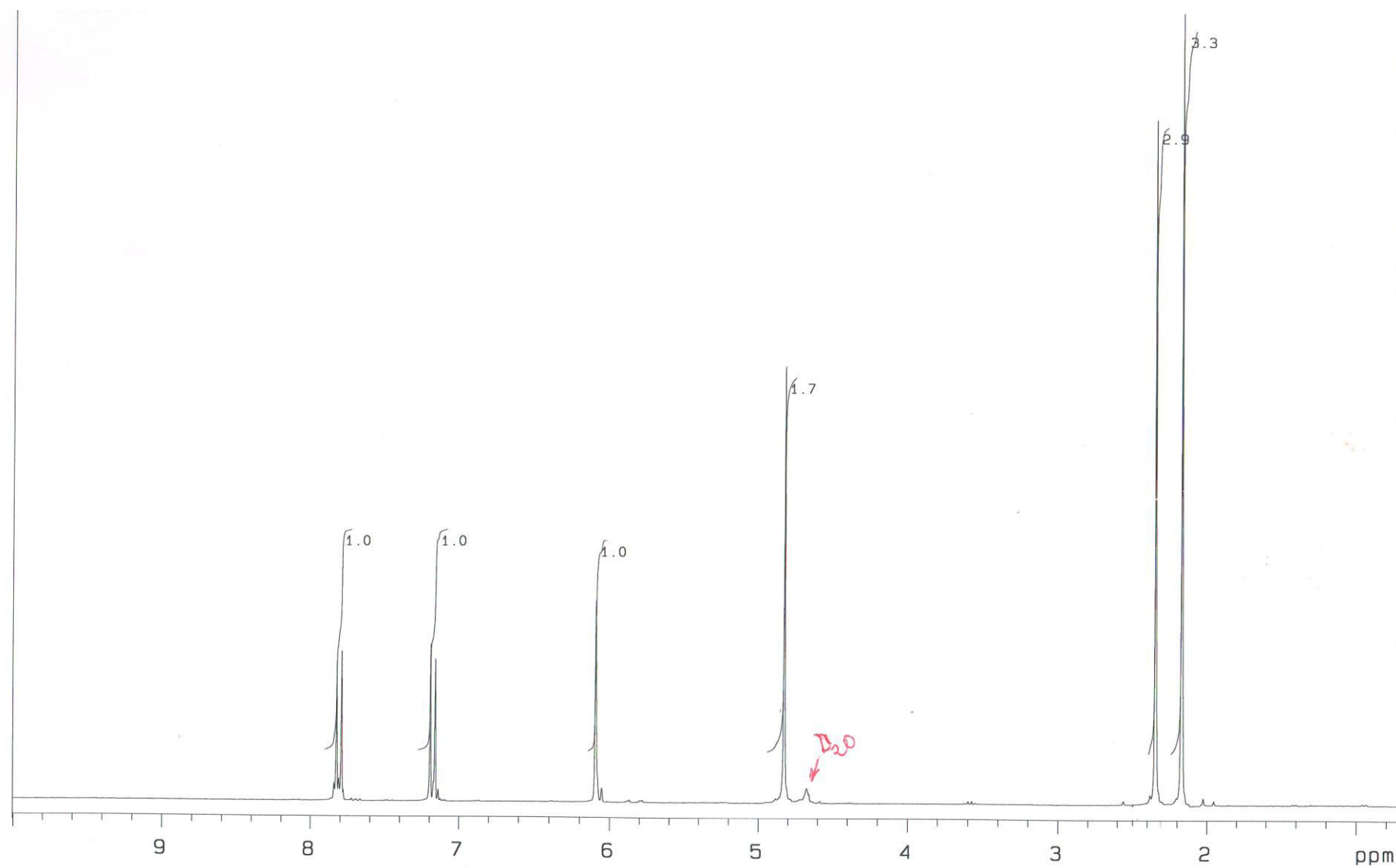
^{13}C NMR spectrum of compound **10**



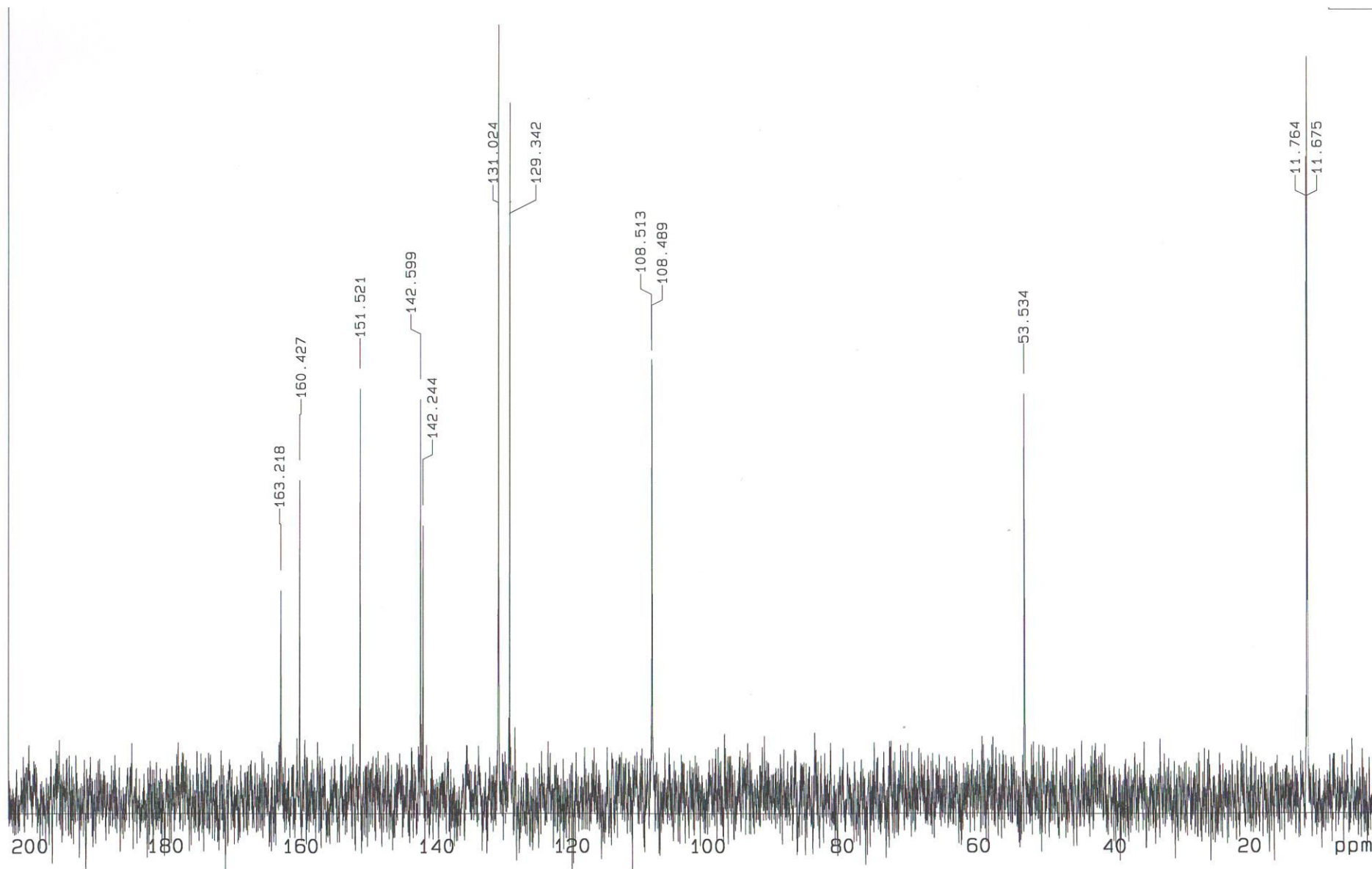
^1H NMR spectrum of compound **12**



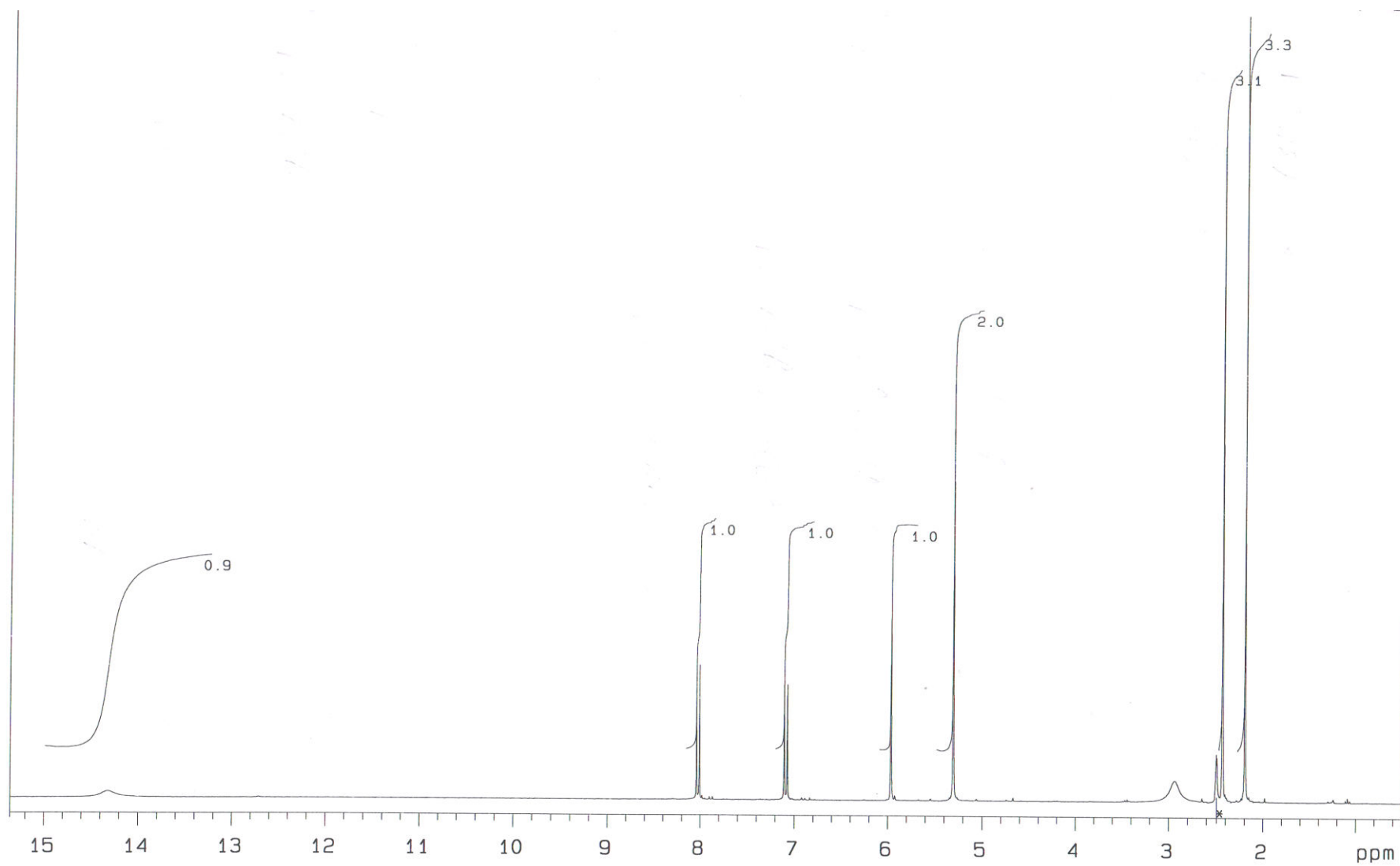
¹³C NMR spectrum of compound **12**



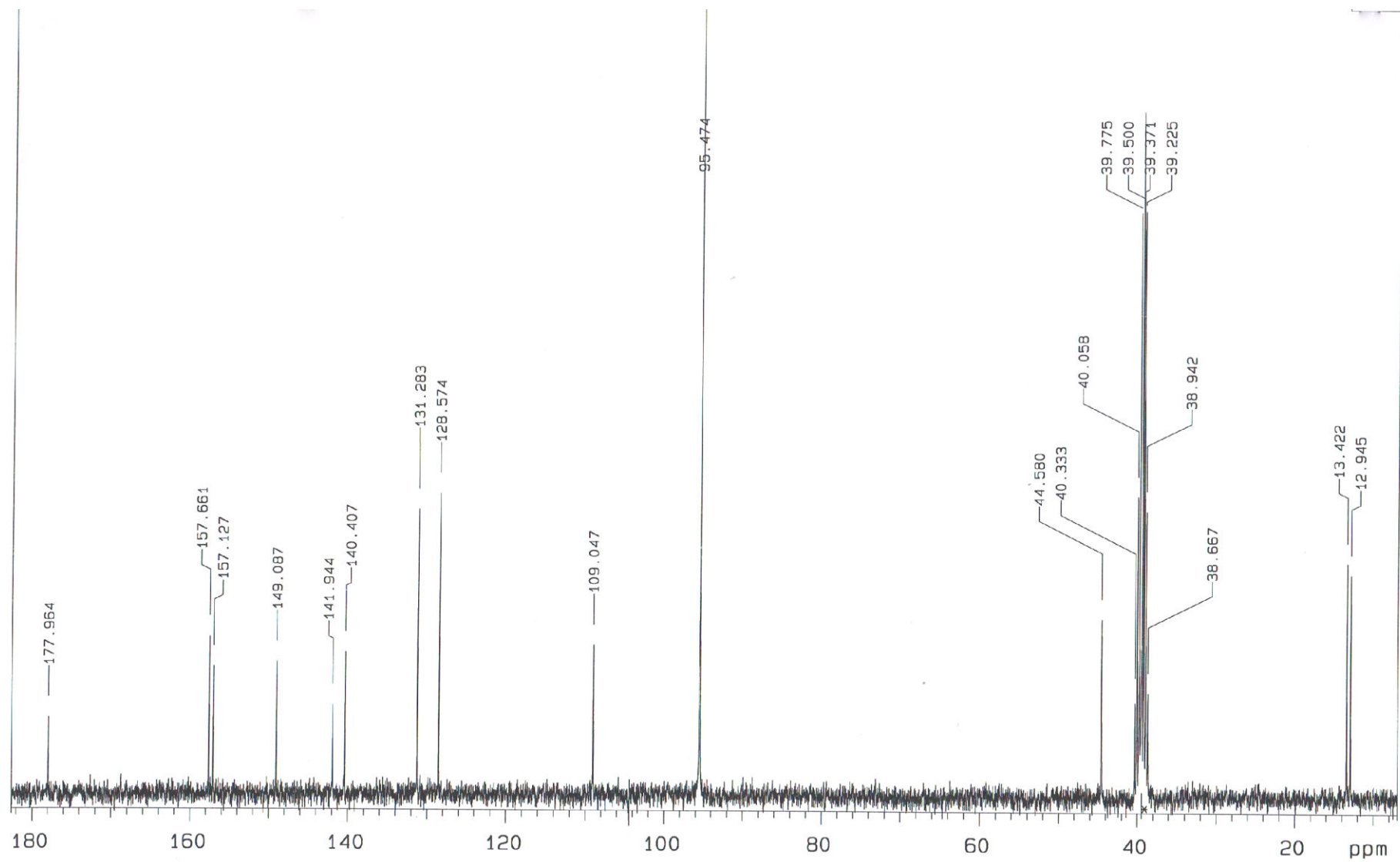
^1H NMR spectrum of compound **13**



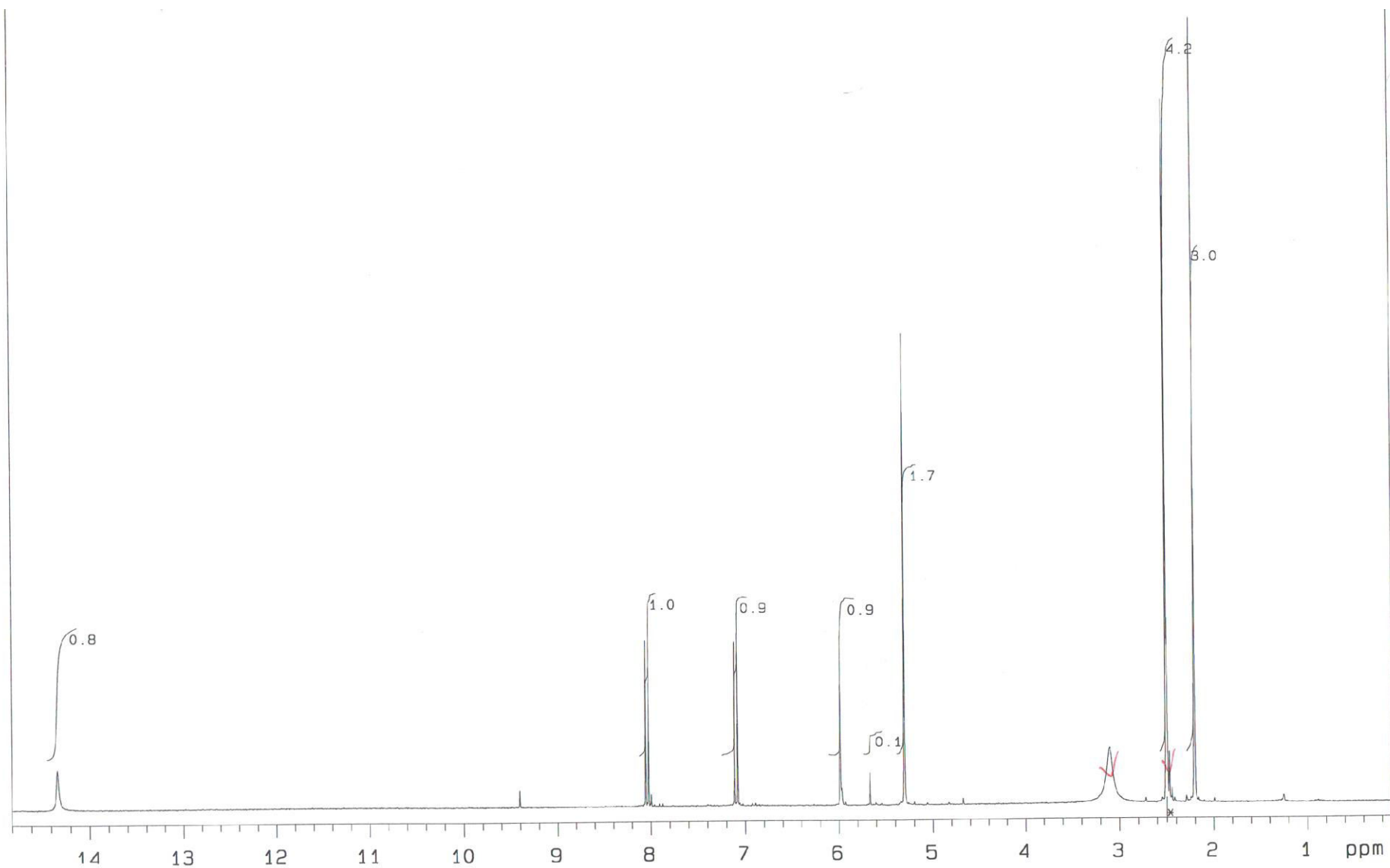
^{13}C NMR spectrum of compound **13**



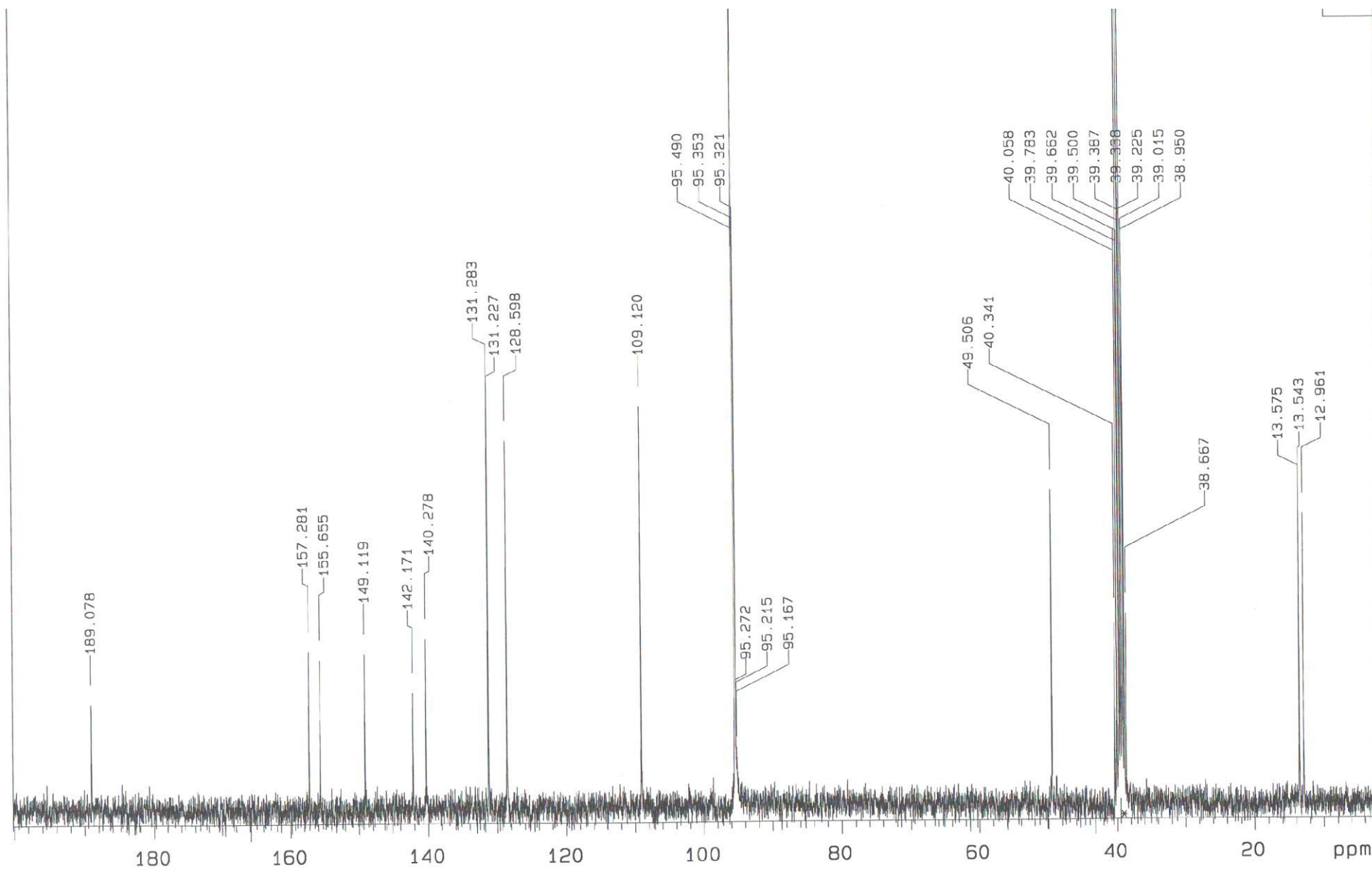
^1H NMR spectrum of compound **14**



^{13}C NMR spectrum of compound 14



^1H NMR spectrum of compound **15**



^{13}C NMR spectrum of compound **15**

Biological properties of the synthesized compounds

Laboratory vegetative studies were conducted to determine the herbicidal, fungicidal and growth-regulating properties of the synthesized compounds. Virtually all compounds did not show noticeable pesticidal properties, but demonstrated a stimulating action on plants growth. For the growth regulatory properties evaluation, the action of aqueous emulsions (25 mg/L and 50 mg/L) of the synthesized compounds on the germination, growth and survivability of seeds and seedlings of dicotyledonous bean (*Phaseolus vulgaris* L.) were studied and compared with that of heteroauxin (IAA). Two series of bean seeds were incubated for 24 hours in appropriate mediums in the dark at 25 °C. Then the seeds were transplanted into soil and watered daily. The experimental data calculations were produced in 20-25 days. The number of plant roots of each series, their length and weight in moist and dry forms, and their average values were calculated. The results were compared with similar data of plants placed in IAA solutions, and the activities of preparations in comparison with IAA (in %) were determined. The growth stimulating activity of the compounds varied in the range of 50–94% compared with heteroauxin (Table 1). The substances **1**, **3b**, **3c**, **7**, **8**, **9**, **15**, which showed the greatest activity in the experiment (more than 80%), were selected for deeper study and further field trials.

Table 1. Growth stimulating activity of the synthesized compounds **1-15**

№	Growth stimulating activity (%)*		№	Growth stimulating activity (%)*	
	Concentration			Concentration	
	25 mg/L	50 mg/L		25 mg/L	50 mg/L
1	84.2	68.2	6	65.0	-
2	59.8	-	7	72.2	91.2
3a	52.1	55.5	8	88.5	59.2
3b	58.8	93.6	9	80.9	87.0
3c	75.1	85.6	10	57.9	69.3
4a	71.5	59.5	12	50.3	39.3
4b	62.6	57.8	14	61.2	68.5
5	68.7	51.8	15	76.3	80.7

* the activity of heteroauxin was taken as 100%